PLANT PROTECTION SECTION

The Plant Protection Section is responsible for implementing laws enacted by the North Carolina General Assembly to protect North Carolina agriculture and its citizens from the entry, establishment, release, and spread of injurious organisms into or within North Carolina.

The mission of the Plant Protection Section is to enhance the quality of life in North Carolina by protecting agriculture and the environment from injurious plant pests, by promoting beneficial organisms, and by protecting rare native plants of the state.

We serve the people of North Carolina by:

- Protecting agricultural crops, horticultural crops and native flora, by preventing or controlling the invasion and spread of injurious insects, plant pathogens, weeds, and other pests of regulatory concern.
- Protecting honey bees by combating the spread of bee pathogens.
- Responding to constantly changing threats to crops, rare native plants, and honey bees by drafting effective and reasonable regulations and by achieving public compliance.
- Supporting agriculture, horticulture and related industries by providing inspection and export services to facilitate the movement of regulated commodities.
- Protecting rare native plants by restoring their habitats, and by propagating and restoring them to the wild.
- Promoting beneficial organisms that serve as biological controls of pest species.
- Providing outstanding service and satisfaction to all our clients.

North Carolina has an extremely wide range of climate, from near tropical along the southeast coast to winter conditions similar to southern Canada in our higher mountains in the west. Such diversity provides suitable environments for an extremely diverse flora and fauna. Extensive international air and sea transportation, both military and commercial, and an extensive Interstate Highway System increase the potential for the accidental introduction of pest organisms into North Carolina. Therefore, North Carolina's Plant Protection Section programs must deal with a wide range of organisms and host-pest interactions.

Major program activities for 2007 included the following:

Apiary Inspection Program

Colony Collapse Disorder (CCD) has been a major topic of discussion by the popular media regarding honey bees and their plight during 2007. The press coverage highlighted the value of honey bees to a broader audience of the citizenry of North Carolina and this served the beekeepers of our state well. Fortunately, for North Carolina beekeepers, CCD has not yet been documented here. However, there have been several other pests, predators and problems that have challenged the state's beekeepers.

The *Varroa* mite continues to be a major threat to the beekeeping industry in North Carolina. Several new pesticides have been registered for use in controlling this pest; however, the mite continues to develop resistance to some of these materials in short order and make it difficult to maintain the efficacy of these products. There have also been references to the growing use of unregistered materials that may or may not be effective in controlling bee pests. Further, the improper use of antibiotics may also further complicate useful treatment regimes.

Another threat facing the beekeeping industry of North Carolina is the establishment of Africanized honey bees (AHB) (*Apes milliner scintillate*) on the eastern seaboard specifically southern Florida. In North Carolina, we are engaged in an outreach program to emergency response personnel in order to familiarize them to the potential threat of AHB. Another aspect of this outreach effort is directed at the structural pest industry and its membership. As part of its monitoring efforts, NCDA&CS' staff, jointly with NCSU staff, are collecting samples of bees in order to determine their geographic origin and their propensity for increased defensive behavior. None of the samples collected through 2007 were determined to be of the AHB type. NCDA&CS has strongly encouraged beekeepers to advise of any colonies that seem to be displaying any unusual or inexplicable defensive behavior such that appropriate responses might be made. This cooperative effort is needed such that we can maintain a beekeeping industry in North Carolina that is not threatened by the reputation of this more defensive type of bee.

The mild winter followed by a very late cold snap (the Easter freeze) set the honey bee colonies back in their capacity to build up. Spring was followed by an extended drought that has limited the amount of forage for the bees this season. Many beekeepers have had to provide supplemental feeding for their bees, and the limited honey flow is also an additional stress factor for the colonies.

Even with all of the preceding difficulties, the state's beekeeping industry is still in reasonably good shape this year. The inspectors continue to assist the beekeepers through field inspections, educational meetings, and field days and to make every attempt to be available to assist the beekeepers in any way necessary. NCDA&CS continues to experience a good working relationship with NCSU staff and assists them in some of their projects. Our goal for 2008 is to continue to improve our overall inspections and in particular our documentation of them. Our ultimate goal is to reduce the rate of honey bee disease and pest problems.

The number of colonies inspected by NCDA&CS' field staff for FY 2007 was 4,439. During these inspections, 29 hives were documented to have American Foulbrood.

Biological Control Programs

During 2007, personnel in the Biocontrol Program continued several projects from previous years and began rearing an additional predator to attack the hemlock woolly

adelgid. A late freeze during the first week in April and the extreme drought across the state significantly influenced insect populations.

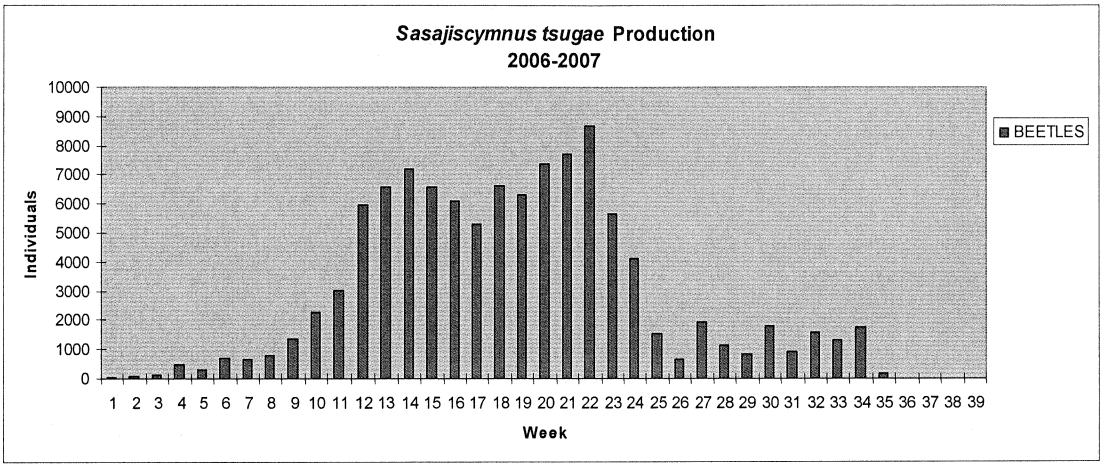
Hemlock Woolly Adelgid. The hemlock woolly adelgid (HWA), *Adelges tsugae*, is an exotic and damaging pest of native hemlock trees in both forest and ornamental settings. In eastern North America, the adelgid occurs on eastern hemlock (*Tsuga canadensis*) and Carolina hemlock (*T. caroliniana*). The HWA was first found in the eastern U.S. in the 1950's, in Virginia, but in the last decade it has spread at a rate of 20-30 km per year with dramatic population increases. It is now present in most of the range of hemlock in North Carolina, as well as the eastern U.S., and is spreading rapidly in natural areas. It appears hemlocks at the southern end of their native range succumb to HWA more rapidly than those in the northern regions. Although some chemical control measures are recommended for landscape trees, control with insecticides is difficult in any setting and impractical to impossible in forest settings. Biological control agents (all predators) have been identified in Asia and the Pacific Northwest, and several species have been mass reared and released in stands of hemlock throughout the eastern states.

The primary objective for this project was for NCDA&CS to operate a large-scale central rearing facility to provide biological control agents for the management of hemlock woolly adelgid (HWA), a devastating pest of hemlock trees. *Sasajiscymnus tsugae* (St), native to Japan has been in mass production at the lab since December 2002. Additionally, a small colony of a second species of predator, *Scymnus sinuanodulus* was obtained January 31 from Mike Montgomery of the Forest Service in Connecticut for rearing on an experimental basis.

Preparations for rearing of *Sasajiscymnus tsugae* began in the fall, cleaning and organizing the lab, and repairing and ordering supplies for rearing. The most intensive rearing started in early January when the adelgid began laying eggs in the lab. Deliveries of beetles to the USDA Forest Service (USDA FS) began February 14, 2007, with 16 – 18,000 turned over to the Forest Service on a biweekly schedule. During 2006-07, 107,643 beetles were raised, and 97,400 were shipped. Forest Service personnel selected release locations based on microclimate and current phenology of adelgids.

Figure one illustrates the seasonal fluctuation of the rearing program. Beetles produced in week one came from jars started 16 October 2006 and egg collection stopped 11 June 2007. Peak production occurred between 1 January and 26 March 2007, synchronized with the progediens egg period. Low temperatures during the first week of April appeared to be detrimental to the HWA population on the hemlock, and production remained lower. The amount of infested hemlock that can be obtained is the limiting factor in production at this time.

Figure 1. Week 1 = 16 October 2006, Week 34 = 11 June 2007.



Cereal Leaf Beetle. During the spring of 2007, the cereal leaf beetle (*Oulema melanopus*) (CLB) insectary located at the Piedmont Research Station near Salisbury, North Carolina, was monitored. Eggs of cereal leaf beetle were collected and shipped to the Colorado Department of Agriculture to augment their *Anaphes flavipes* rearing program. Samples of larvae were collected from growers' fields in four additional counties and dissected to determine the presence of larval parasitoids.

Populations of CLB in the insectary were extremely low, never going above 1/sq ft on any of the sample dates. Larvae were not collected, but were left in the field for the parasitoids to attack. Adults and larvae were collected in Lincoln and Cleveland Counties and added to the insectary. Results are shown in Table 1. All parasitoids found were *Tetrastichus julis*.

Table 1. Cereal leaf beetle dissections 2007.

Date	Location	# Dissected	% Parasitized	# of Parasitoids
20 April	Lincoln Co, Lutz	50	28	3.5/larvae
	Lincoln Co, Wyant	26	42	2.9/larvae
	Cleveland Co, Humphrey	15	46	2.9/larvae
	Cleveland Co, Hudson	30	7	4.0/larvae

Pseudaulacaspis pentagona. Dr. Peter Follett, USDA-ARS, Hawaii, contacted us regarding the identification and possible eventual importation of parasitoids for the biological control of white peach scale, which has become a serious pest of papaya.

Peach branches infested with white peach scale were collected from three North Carolina orchards (22-23 January 2007) by Dr. John Meyer (NCSU). The branches were placed into emergence cages in the Beneficial Insects Laboratory, and parasitoids were collected, identified and preserved. Parasitic Hymenoptera were collected from each of

the three locations; a total of 80 *Encarsia berlesei*, 15 *Aphytis proclia*, and one unknown. The insects will be given to Dr. Follett, and plans discussed for future work on the project.

Harmonia axyridis. Studies of the introduced multicolored Asian lady beetle *Harmonia axyridis* were continued during 2007.

An experiment set up 30 Oct - 7 Dec 2006 to investigate behavioral patterns of transmission of the fungus *Hesperomyces virescens* among *H. axyridis* during the winter aggregation period was disassembled 13 - 22 March 2007. Mortality was assessed and the surviving insects preserved in alcohol; these will be examined microscopically for the presence of fungus, and the data then analyzed.

Thirty adult *Harmonia axyridis* were collected live on the outside of a light trap on the grounds of the Beneficial Insects Laboratory in Cary, North Carolina, 1 June - 19 July 2007. The insects were frozen to immobilize, then placed into alcohol and stored in the freezer prior to shipping to Robert Koch, Minnesota Department of Agriculture, for his use in molecular studies of the insect.

Two papers were published in professional journals during 2007; a third is in press and should be published before the end of the year:

Nalepa, C.A. and A.Weir, 2007. Infection of *Harmonia axyridis* (Coleoptera): Coccinellidae) by *Hesperomyces virescens* (Ascomycetes: Labouleniales): Role of mating status and aggregation behavior. Journal of Invertebrate Pathology 94: 196-203.

Nalepa, C.A. and A.Weir, 2007. *Harmonia axyridis* (Coleoptera: Coccinellidae) in buildings: Relationship between body height and crevice size allowing entry. Journal of Economic Entomology 100: 1633-1636.

Nalepa, C.A. 2007. Fly catcher effect in *Haramonia axyridis* (Pallas)? No attraction to lady beetle images on flight traps. Journal of Entomological Science 42: *in press*.

A poster was prepared and will be presented at the Annual Meeting of the Entomological Society of America in San Diego, California, 9-12 December 2007: "Attraction of *Harmonia axyridis* to Outdoor Blacklight Traps: Seasonal and Diurnal Pattern in North Carolina", by Christine A. Nalepa.

Imported Fire Ant Biological Control. The phorid fly, *Pseudacteon tricuspis* has been released in six counties in North Carolina over the past seven years. To date, based on field monitoring, no sustained phorid fly populations have been found at any of the past release sites. A small number of *P. tricuspis* flies, 5,206 were released in Scotland County this year, in conjunction with a release of *P. curvatus.*

Scotland County site. *P. curvatus* was released in Scotland County during September 2007. An estimated 13,008 flies were released over a two week period starting 10 September. The first generation of phorid flies was found Nov. 1, thirty four days after release. Monitoring for flies will commence in the spring when daytime temperatures reach 70° F or above for several consecutive days.

Wake County site. *Pseudacteon curvatus* was released in Wake County in April 2005. After an unseasonably warm winter, monitoring began early and the first phorid fly was found on March 15, 2007 at the Wake County release site. To delimit phorid fly expansion, surveys were conducted in the fall after fly populations had built up and were being found consistently. Less than three years after their initial release in Wake County, phorid flies were found 17 miles from the release site at locations to the east, north and south.

Pseudacteon curvatus is showing more potential for establishment in this state than *P. tricupsis*. *P. curvatus* shows a preference for smaller workers common to polygyne colonies and in the field appears more active than *P. tricupsis*. If the population of imported fire ants in North Carolina shifts toward multiple queen colonies, *P. curvatus* will become more important as a management tool. Additional species of phorid flies are being tested by USDA-ARS, and as they become available for release we would like to evaluate them as biological control agents and management option.

Cooperative Agriculture Pest Survey (CAPS) Program

The Cooperative Agricultural Pest Survey (CAPS) is a joint initiative between the United States Department of Agriculture, Animal and Plant Health Inspection Service, Plant Protection and Quarantine (USDA-APHIS-PPQ) and the NCDA&CS to fund and implement domestic surveys of harmful or economically significant plant pests and weeds that have not been detected by front-line inspections at our ports of entry. These surveys are necessary to safeguard our nation's agricultural and natural resources by detecting early pest infestations or introductions which validates our trading partners concerns for pest status. Typical surveys target exotic pests, pests of export significance and pests that are not known to occur in the U.S., but can also include regionally established pests. A strong domestic pest detection infrastructure and headquarters/regional staff is vital to ensuring that scientifically valid, current, and reliable pest/disease survey data is available on a continuing basis. Additionally, staff support is also critical at the state level and federal funding provided for a State CAPS Survey Coordinator position to be housed within the NCDA&CS' Plant Industry, Plant Protection Section.

The State CAPS Committee met twice on May 24, 2007 and June 7, 2007.

Summary of 2007 Core Project Surveys

Viburnum Leaf Beetle

The Viburnum Leaf Beetle is a serious pest of viburnum, a valuable landscape plant. Heavy infestations can defoliate shrubs, cause dieback, and eventually kill the plant. The beetle's known range is Ohio, Pennsylvania, New York, Vermont, New Hampshire, Massachusetts, and Connecticut. Visual surveys were conducted in Ashe, Avery, Mitchell, Watauga, and Yancey Counties by personnel of both NCDA&CS and the North Carolina Forest Service (NCFS). No evidence of Viburnum Leaf Beetle was detected.

Snail and Slug Survey

There are numerous pathways now present for the introduction of new plant pests, including snails and slugs. Many of these are or could be moderate to serious pests of agricultural crops. In addition, some are known to carry diseases that affect humans as well as livestock.

The purpose of the outlined survey was to determine the presence of possible new snail introductions in North Carolina. All specimens collected were to be sent to the proper authorities for inclusion in the DNA analysis program of the North American Slug Project. Some surveys during the summer were accomplished by the part-time technician assisting the State Survey Coordinator. The rail-yard at Hamlet was surveyed several times by the technician during the summer. This site was selected because it is the major hub for east-west and north-south rail traffic in this state. Snails in other parts of the country have been found in close proximity to large rail yards with heavy containerized traffic. None of the targeted snails were found. Although some snails were collected, they all proved to be native species.

In addition, USDA-APHIS-PPQ conducted surveys at several commercial sites dealing with tile imports. Some suspect snails were found, but identification determined them to be natives.

NCDA&CS' field specialists were requested to survey for snails and slugs as a component part of their nursery/nursery dealer inspections. In North Carolina, there are approximately 1,800 nurseries and nearly 2,300 nursery dealers. No suspect snails or slugs were found by field personnel.

Inula britannica

Inula britannica L. is a rhizomatous perennial or biennial of the aster family. Native to Europe and Asia, it is now widespread in the Palearctic Region, occurring from Spain to Japan and north to Scandinavia and Siberia. It occurs primarily in moist habitats including ditches, stream banks, wet woods, and moist meadows. It has become an aggressive weed in field grown hostas in the Netherlands and has been introduced into North America via propagative material. It has the potential to become a serious weed pest in the U.S. It has been found at several hosta nurseries in Michigan and was

detected in hosta plants in Wilson County in 2000-01. Eradication measures were conducted and no further detections have occurred.

The objective of this field survey project was to determine the presence or absence of *Inula* in hosta plant material in North Carolina. The approach was to utilize existing NCDA&CS' field personnel to survey for *Inula* as part of their routine nursery and nursery dealer inspections. No *Inula britannica* infestations were found in North Carolina in 2007.

Pink Hibiscus Mealybug
Pink Hibiscus Mealybug is a serious threat to agriculture in the U.S. since it can attack over 200 plants. In North Carolina, hosts include: corn, cotton, cucumber, grape, hibiscus, okra, peanuts, pumpkin, rose, and soybeans.

NCDA&CS' field specialists were requested to visually survey for pink hibiscus mealybug as a component part of their nursery/nursery dealer inspections. No suspect specimens were found in 2007

Summary of 2007 Exotic Pest Survey Projects

EXOTIC FRUIT PESTS

Several moths are known to be serious threats to fruit production areas in North America. Some of the most serious were surveyed for in North Carolina during 2007. Wing traps were placed in likely sites on June 1st and were monitored until September 30th. Below are the survey targets.

Fruit Tree Tortrix Moth
This moth pest is currently established in British Columbia and was trapped in the state of Washington. In North Carolina, this moth has the potential to be damaging to fruit of apples, plums, and blueberries. In addition, this moth is capable of feeding on many forest and ornamental trees including maple, oak, elm, walnut, birch, hawthorn, and many others. Wing traps were placed in abandoned apple orchards in four western counties: Henderson, Mitchell, Wilkes, and Yancey, and were monitored monthly during the summer. No Fruit Tree Tortrix Moth adults were detected. .

Summer Fruit Tortrix Moth
This moth pest has two generations per year and is a serious pest of apples, pears, and peaches. The first generation larvae feed on leaves and flowers of host plants with adult emergence occurring in June. Second generation larvae feed on the fruit. Adult emergence occurs in August. At the present time, this moth is not present in the U.S. Wing traps were placed in abandoned apple orchards in four western counties: Henderson, Mitchell, Wilkes, and Yancey, and were monitored monthly during the summer. No Summer Fruit Tortrix Moth adults were detected.

Light Brown Apple Moth
This moth is a highly polyphagous pest of over 120 plant genera in over 50 families with a preference for hosts in the Compositae, Leguminosae, Polygonaceae, and Rosaceae. Some host plants are: apple, blueberry, camellia, grape, oak, persimmon, pine, potato, strawberry, and viburnum. While this pest has been intercepted at several ports of entry in the U.S., it has failed to become established. Wing traps were placed in abandoned apple orchards in four western counties: Henderson, Mitchell, Wilkes, and Yancey, and were monitored monthly during the summer. No Light Brown Apple Moth adults were detected.

Apple Ermine Moth
This moth has one generation per year and is a serious pest of all varieties of apples. A native of Eurasia, it was discovered near Bellingham, Washington in 1985. By 1992, it had spread throughout Washington and northern Oregon. Its larvae feed mainly on leaves and can seriously defoliate apple trees in a matter of a few weeks. The larvae feed gregariously within a web similar to eastern tent caterpillar and fall webworm. Visual inspections and wing traps were placed in abandoned apple orchards in four western counties: Henderson, Mitchell, Wilkes, and Yancey, and were monitored monthly during the summer. No Apple Ermine Moth adults were detected.

Cherry Ermine Moth
This moth is identical in appearance to the Apple Ermine Moth but is found on different hosts--cherry, peach, plum, hawthorn and mountain ash. At the present time, it has not been detected in the U.S., although it is established in southwestern British Columbia and Vancouver Island in Canada. Like the larvae of the Apple Ermine Moth, larvae of this moth also feed gregariously within a web. Visual inspections were conducted and pheromone-baited wing traps were placed in abandoned peach orchards in the Sandhills area of North Carolina in Montgomery County. In addition, traps were placed in an abandoned peach orchard in Franklin County. No Cherry Ermine Moth adults were detected.

EXOTIC COTTON PESTS

Pests of cotton for which surveys were conducted in 2007 were the Egyptian Cotton Leafworm (ECW), Rice Cutworm (RC), False Codling Moth (FCM), and Old World Bollworm (OWB). These are all multivoltine species that pose a high degree of risk to U.S. agriculture ecosystems.

ECW is native to the Mediterranean area, the Middle East, and much of Africa. RC is found in Asia and Africa; FCM is endemic to sub-Saharan Africa. OWB can be found in Africa, Asia, Australia, the western Pacific region, and the Middle East. All of these pests are highly polyphagous and combined can infest more than 40 families of plants. Traps were set and baited and monitored by regional agronomists within NCDA&CS and by personnel with USDA-APHIS-PPQ. Traps were placed in Anson, Beaufort, Bertie, Cleveland, Craven, Edgecombe, Greene, Halifax, Hyde, Johnston, Lenoir, Martin, Nash,

Pitt, Richmond, Stanly, Union, Wake, Warren, Wayne, and Wilson Counties. Traps were examined at the end of the season. No suspect exotics were observed.

EXOTIC SOYBEAN PESTS

Soybean Aphid and Soybean Pod Borer
Soybean Aphid is a recently introduced pest of soybeans in the U.S. Originally, a native of China and Japan, it was first identified in the U.S. in the summer and fall of 2000 in several Midwestern states. Like most aphids, it is able to build high populations in a short period of time. Infestations that peak at the bloom stage can stunt the plants producing fewer pods, thereby lowering yields. Currently, this aphid is the only one in North America capable of developing large populations on soybeans. It has been detected in Virginia counties bordering North Carolina. Visual surveys were conducted in northeastern North Carolina. Soybean aphid was detected in soybean fields in Edgecombe, Gates, Nash, Perquimans, and Warren Counties.

Soybean Pod Borer is a pest of legumes in tropical and subtropical regions of the world; central and southern Africa; Southeast Asia from India to Japan and Australia; several Pacific Islands including Hawaii; southern Mexico to tropical South America, including the West Indies. Although plants are not killed, a large proportion of the pods may be damaged and unmarketable. Visual surveys conducted by North Carolina Extension Service personnel found no evidence of this pest in this state.

EXOTIC WOOD-BORING PESTS

Wood Boring/Bark Beetle Survey
Although this survey is conducted primarily by USDA-PPQ personnel, NCDA&CS' Field Specialists were alerted, as part of their survey activities, to be on the watch for the Asian Long-horned Beetle and Emerald Ash Borer statewide and the Japanese Cedar Long-horned Beetle in Dare County. None were detected.

European Wood Wasp
This pest is a native of Europe, Asia, and northern Africa. It has become established in South Africa, South America, Australia and New Zealand. A serious threat to living conifers, it has caused 80% mortality at loblolly pine plantations in Argentina. Within the last four years, it has become established in 26 counties in New York and six in Pennsylvania; it has been detected in one county each in Michigan and Vermont. Working in conjunction with the North Carolina Forest Service, intercept traps were set out in pine forests and plantations in the following counties: Alexander, Alleghany, Ashe, Beaufort, Burke, Caldwell, Chatham, Davidson, Durham, Franklin, Granville, Halifax, Henderson, Lincoln, Moore, Nash, Northampton, Orange, Person, Pitt, Randolph, Transylvania, Vance, Wake, Warren, Washington, Watauga, and Wilkes. Traps were placed in the field in mid-June and monitored bi-weekly until October 1st. Examination of the collected samples confirmed the absence of this pest in North Carolina.

NAPIS Data Entry for North Carolina

The State Survey Coordinator is responsible for submitting survey results to the NAPIS Database. Organisms for which data was entered in 2007 follows:

Diseases

Sudden Oak Death – *Phytophthora ramorum*
Austro-Asian Soybean Rust – *Phakopsora pachyrhizi*

Mollusks

Striped snail – *Cernuella virgata*
Hygromiid snails – *Xerolenta obvia*
Monacha cartusiana
Golden apple snail – *Pomacea canaliculata*
Helicarionid snail – *Ovachlamys fulgens*

Insects

Viburnum Leaf Beetle – *Pyrrhalta viburni*
Khapra Beetle – *Trogoderma granarium*
Pine Shoot Beetle – *Tomicus piniperda*
Spruce Bark Beetle – *Ips typographus*
Sixtoothed Bark Beetle – *Ips sexdentatus*
Redhaired Pine Bark Beetle – *Hylurgus ligniperda*
Sixtoothed Spruce Bark Beetle – *Pityogenes chalcographus*
A bark beetle – *Hylurgops palliates*
Soybean Aphid – *Aphis glycines*
Soybean Pod Borer – *Maruca vitrata*
Pink Hibiscus Mealybug – *Maconellicoccus hirsutus*
Africanized Honey Bee – *Apis mellifera*
Gypsy Moth – *Lymantria dispar*
Egyptian Cottonworm – *Spodoptera littoralis*
Rice Cutworm – *S. litura*
False Codling Moth – *Cryptophlebia leucotreta*
Old World Bollworm – *Helicoverpa armigera*
Light Brown Apple Moth – *Epiphyas postvittana*
Summer Fruit Tortrix Moth – *Adoxophyes orana*
Fruit Tree Tortrix Moth – *Archips podana*
Apple Ermine Moth - *Yponomeuta malinellus*
Cherry Ermine Moth - *Y. padellus*

Weeds

Tropical Spiderwort – *Commelina behghalensis*
Meadow Fleabane – *Inula britannica*
Purple Loosestrife – *Lythrum salicaria*

Small Broomrape – *Orobanche minor*
Mile-A-Minute Weed – *Polygonum perfoliatum*
Giant Salvinia - *Salvinia molesta*
Witchweed – *Striga asiatica*
Tropical Soda Apple – *Solanum viarum*
Oriental Bittersweet – *Celastrus orbiculatus*
Puncturevine – *Tribulus terrestris*
Bushkiller - *Cayratia japonica*
Itchgrass - *Rottboellia cochinchinensis*

Entomological Programs

Movement of Live Insects for Research or Commercial Purposes

The NCDA&CS evaluated and approved federal application form PPQ 526, for the movement of live plant pests into North Carolina for 438 insect species, which includes several multiple entries. This number was up from 240 species in 2006. The large number of applications to move plant pests into North Carolina reflects the continued market in commercial production, sale, and movement of butterflies for education, outdoor weddings, and other functions, in addition to the substantial amount of scientific research conducted in North Carolina academic and private institutions.

Boll Weevil Eradication Program

Cotton acreage for 2007 was 493,599 acres. Cotton was grown in 56 counties. There were 21,837 traps installed on 18,316 cotton fields. Trap installation began July 20, 2007, and trap removal was completed November 18, 2007. Nineteen temporary employees were hired to assist with quality control and trapping.

Boll Weevil Captures

No boll weevils were captured during the 2007 cotton-growing season.

North Carolina Boll Weevil Assessment Information
(As of December 1, 2007)

	2007	2006	2005
Number of Acres	493,599	862,677.00	807,032.31
Number of Growers	2,047	2,791	2,714
Acre Assessment	$2.50	$3.25	$3.50
Assessments Due	$1,246,104.41	$2,803,700.20	$2,824,613.09

Boll Weevil Trapping Data by County

2007 Boll Weevil Trapping Summary							
County	**Acres**	**Fields**	**Traps**	**County**	**Acres**	**Fields**	**Traps**
Anson	3234	123	137	Lenoir	18020.1	761	850
Beaufort	15241.8	157	320	Lincoln	43	2	2
Bertie	27550.41	751	967	Martin	33299.4	1468	1618
Bladen	4977.11	177	275	Montgomery	1228.4	64	71
Cabarrus	521.9	27	30	Moore	58.2	8	8
Camden	653.5	17	21	Nash	9332.88	550	592
Carteret	5329.5	86	153	Northampton	41655.9	1390	1707
Catawba	0	0	0	Onslow	2553.7	123	135
Chatham	0	0	0	Pamlico	1325	20	36
Chowan	10862.4	467	516	Pasquotank	1577.4	41	50
Cleveland	1999.1	119	124	Pender	856	24	29
Columbus	4877.06	264	382	Perquimans	11655.5	318	386
Craven	2337.6	37	66	Pitt	16970.7	682	765
Cumberland	5497.51	309	330	Richmond	2201.2	24	42
Davidson	253.3	9	12	Robeson	22556.6	959	1278
Duplin	4047.4	141	165	Rowan	693.4	43	45
Edgecombe	28551.11	1095	1136	Rutherford	195.5	8	8
Forsyth	111.86	18	18	Sampson	19699.45	881	934
Franklin	122.9	13	13	Scotland	10369	514	709
Gaston	76	3	3	Stanly	8188.7	347	377
Gates	10714.2	361	442	Stokes	73.79	7	7
Greene	11758.04	476	530	Tyrrell	2817.1	31	82
Halifax	42536.63	1355	1759	Union	3294.81	135	151
Harnett	12005.2	668	715	Wake	138.8	23	23
Hertford	9517.2	412	446	Warren	1074.9	79	93
Hoke	12204.39	341	419	Washington	7267.7	81	211
Hyde	15505.66	160	327	Wayne	9168.55	394	427
Iredell	0	0	0	Wilson	18413.62	889	955
Johnston	9355.55	560	575	Yadkin	0	0	0
Jones	8693.3	283	343				
Lee	335.35	21	22	**TOTALS**	493599.3	18316	21837

Imported Fire Ant Survey and Monitoring Program

The red imported fire ant (RIFA) continued to spread into new areas in North Carolina in 2007. Surveys have been tabulated and an evaluation for the extension of the quarantine is currently being considered. Revisions to the IFA quarantine are anticipated for the 2008 calendar year. Those recommendations will be published in early January 2008.

Four temporary employees worked to survey along the existing quarantine line in 45 counties. The table below summarizes the 2007 RIFA temporary employee survey efforts.

RIFA Work Completed In 2007

RIFA Survey Totals by County

County	Miles Surveyed	Acres Surveyed	New Sites
Alamance	607	87	2
Bertie	116	3	11
Bladen	2	0	0
Brunswick	20	0	0
Buncombe	1595	149	4
Burke	1451	128	1
Cabarrus	39	14	0
Camden	154	1	2
Catawba	1945	218	13
Chowan	23	1	0
Currituck	200	3	0
Dare	120	5	0
Davidson	1884	261	45
Davie	1031	151	1
Durham	331	31	19
Forsyth	535	85	0
Franklin	1409	81	53
Gates	172	7	5
Graham	602	259	8
Granville	264	8	6
Guilford	1111	169	0
Halifax	682	33	6
Haywood	1236	356	0
Henderson	709	591	1
Hertford	359	12	12
Iredell	1224	139	12
Jackson	2893	352	3
Lenoir	83	9	0
Lincoln	1502	160	6
Macon	694	639	12
Martin	91	0	16
McDowell	1340	89	1
Nash	1072	73	32

New Hanover	53	5	0
Northampton	329	8	0
Orange	5105	267	149
Pasquotank	406	8	12
Perquimans	137	4	5
Randolph	1605	219	32
Rowan	1192	165	15
Rutherford	1698	181	19
Swain	1486	65	0
Transylvania	532	117	1
Vance	255	19	5
Warren	134	5	0
Total	38428	5177	509

Thirty-two imported fire ant inspection blitzes were carried out at North Carolina weigh stations in support of the federal fire ant quarantine on movement of articles regulated by the quarantine. A total of 246 trucks were inspected and 70 media/soil samples were collected for analysis. Additionally, four potted media samples were taken from nurseries under IFA quarantine compliance to determine if bifenthrin was properly incorporated. Results from three of the four were good; the fourth nursery needs improvement. Several paperwork violations both in-state and out-of-state were addressed. There were approximately 50 people educated on the IFA Program during six IFA presentations given throughout the state for various agricultural agencies. The IFA Quarantine Program responded to more than 200 calls and requests for information that came in from consumers during 2007.

Sweetpotato Weevil Trapping Program

In 2007, NCDA&CS' personnel continued the statewide comprehensive sweetpotato weevil trapping survey on all commercially grown sweet potato fields. Traps containing the female sweetpotato weevil's pheromone were placed at the rate of one trap per ten acres with a minimum of two traps per field. Commercial sweet potatoes were grown in 40 counties for a total of 40,315.14 acres. There were 9,396 traps placed in 4,143 fields. The traps in all the commercial production areas were negative for 2007.

Storage facilities continue to be monitored on a year-round basis with one trap placed in each section of the storage house and an additional trap stationed outside the principal entrance. No sweetpotato weevils were captured during 2007.

2007 Blueberry Export Certification Program

The Canadian Food Inspection Agency requires all fresh blueberries shipped to Canada come from growers who participate in a Blueberry Certification Program. The program consists of monitoring and control procedures for the blueberry maggot, *Rhagoletis mendax.* Forty-four North Carolina production areas were monitored (4,475.4 acres total representing 92 fields) throughout the harvesting and shipping period and were issued certification documents. No blueberry maggots were detected in any of the fresh market blueberries being shipped to Canada in 2007.

2007 Gypsy Moth Slow the Spread and Eradication Program

In 2007, NCDA&CS' Plant Industry Division carried out an extensive survey and treatment program for gypsy moth. The program was divided into two separate areas, Slow the Spread (STS) and Eradication.

The 2007 *Btk* treatment season began on April 19th and ended on April 25th. A total of 732 polygon acres in the eradication area and 1,154 acres in the (STS) area received two applications of Foray 76B at 1/3 gallon per acre. Kent Neise with Prime Air LLC, received the contract at a price of $23.83 per acre for the *Btk.* One Turbine Thrush aircraft was used. The daily production rate averaged out to be 1,025 acres/hour with an efficiency rate of 583 acres per hour. The treatments took longer than expected due to weather and large distances between some of the blocks. All *Btk* treatments were found to be successful. Only two moths were caught (one per trap) in all four treatment blocks.

There were two ground treatments this year at locations of high population densities where numerous egg masses were found. The Oxford ground treatment (Foray 76B at 1/3 gallon per acre) was successful both in suppressing defoliation and in drastically reducing trap catches nearby. The Weldon ground treatment (Mimic 2LV at ½ gallon per acre) was located at the core of the Weldon aerial spray block. Only one moth was caught, and it was not close to the ground treatment site.

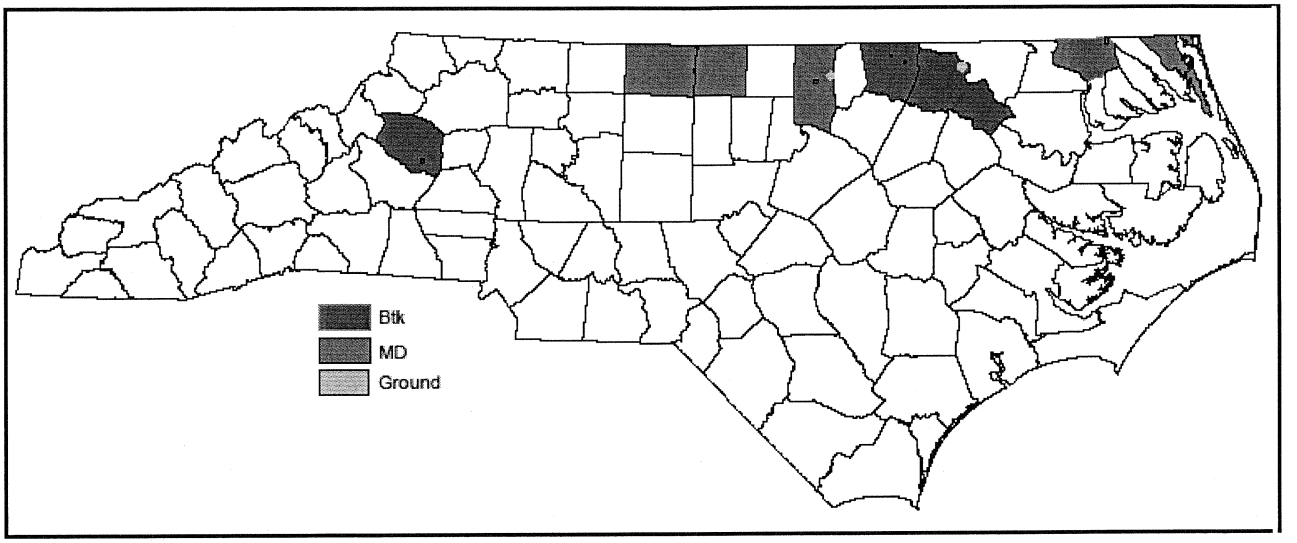
The flake treatments began on June 5th and ended on June 17th. Al's Aerial Spraying treated five blocks totaling 3,739 acres with one application of Disrupt II (1,634 acres at 15 grams per acre and 2,105 acres at six grams per acre). The treatments went smoothly until it was time to treat the Corapeake block. The Great Dismal Swamp National Wildlife Refuge had not obtained the necessary permissions for us to treat; we waited longer than a week for the permissions. Faced with the possibility the block would not be treated, an intensive grid was set on the block. However, the block was treated at the very end of the biological window (June 17), and the treatment appears effective, as no moths were caught in the contingency intensive grid.

Gypsy Moth Treatments

Block Name	County	Application	Dose	Treatment Success **	Polygon Acres	Application Date 1st 2nd	
Berea	Granville	Disrupt II	6 g ai/ac		933	5 June	
Brosville	Caswell/Rockingham	Disrupt II	6 g ai/ac		672	5 June	
Corapeake	Gates	Disrupt II	15 g ai/ac		1034	17 June	
Knotts Island 07	Currituck	Disrupt II	15 g ai/ac		600	5 June	
Ruffin	Caswell/Rockingham	Disrupt II	6 g ai/ac		500	5 June	
Granite Falls	Caldwell	Foray 76B X 2	25 BIU/ac	1.00	732	20 April	25 April
Macon East	Warren	Foray 76B X 2	25 BIU/ac	0.99	361	19 April	25 April
Macon West	Warren	Foray 76B X 2	25 BIU/ac	0.99	413	19 April	25 April
Weldon	Halifax	Foray 76B X 2	25 BIU/ac	0.98	380	19 April	25 April
Oxford-ground	Granville	Foray 76B X 2	38 BIU/ac	0.98	8	20 April	10 May
Weldon-ground	Halifax	Mimic	1/2 gal/ac		3	19 April	
Disrupt Acres					3,739		
Btk Acres					1,886		
Total Ground					11		
TOTAL ACRES					5,644		

***** Treatment Success is determined by STS Decision Algorithm; it ranges from below 0 (unsuccessful) to 1.00 (successful).***
MD blocks are not evaluated until the following year.

Gypsy Moth Treatment County Locations



Gypsy Moth STS (GMSTS) Regulatory Program

For the 2006-2007 GMSTS Regulatory Program, emphasis was placed on reviewing compliance agreements and mill inspections. All mills in the STS area under compliance agreements were visited. There were 43 mill inspections conducted to ensure complete paperwork and to inspect logs for egg masses. During this period, 19 new compliance agreements were issued. For the period, 79 people in nine different training sessions were trained to identify gypsy moth life stages. An additional 114 people attended three Pro-Logger meetings sponsored by the North Carolina Forestry Association. Cooperation has continued with Virginia Department of Agriculture's STS regulatory personnel to carefully monitor all companies that are sending logs into North Carolina.

There were 107 priority traps placed and monitored at mills, campgrounds, rest areas, welcome centers, and other locations at high risk for artificial gypsy moth movement. Numerous firewood and Christmas tree inspections were conducted from October to December. Many nurseries/garden centers were provided with information (quarantine maps and brochures) on gypsy moth. U-Haul dealers were given "Don't Move Gypsy Moth" brochures. County offices of the North Carolina Forest Service and the North Carolina Cooperative Extension Service were contacted and provided with gypsy moth literature.

The Plant Pest Inspector also worked closely with loggers and mills involved in the harvesting of Atlantic White Cedar in the Great Dismal Swamp National Wildlife Refuge, where there are high gypsy moth populations. This included training sessions for individuals to inspect loads and complete proper certification statements.

Gypsy Moth Trapping Program

The 2007 trapping program was divided into two different areas, (STS) and statewide. In the (STS) area, traps were placed on a 2-kilometer base grid with 1-Kilometer and 500-meter delimit grids in areas that had high catches or treatments in 2006. The (STS) area was divided into 22 separate trapping bid units. Seven private contractors placed and pulled 7,552 traps at an average cost of $17.27 per trap.

This was the first year in which there was no STS midseason inspection. It appears this significantly reduced the contracting cost (down from the 2004-2006 three-year average cost of $26.30 per trap). This translates to an approximate average North Carolina STS savings of $68,200. However, we saw a corresponding increase in the number of traps that were missing at the end of the season, from 105 in 2006 (185 missing traps were replaced at the midseason check) to 257 in 2007. This missing information has real monetary value; for example, the proposed Warren County *Btk* treatment block is potentially at least 50 acres larger (or $3,000 at $30 per acre for two applications) than it would have been if the two missing traps had been replaced at the midseason check. However, at $30 per acre, missing traps would have to add at least 1,137 acres to double application *Btk* blocks for STS to lose more money than is saved.

The Statewide traps were placed on a 3-kilometer base grid with 500-meter grids in areas of concern. The North Carolina Forest service placed 3,289 traps in 28 counties in the statewide program. A total of 17 temporary employees and 20 field specialists set traps in the remaining counties. Between the STS and statewide programs, a total of 18,578 traps were deployed in 2007 with 3,500 moths caught out of 2,311 positive traps.

The Winston-Salem block, which was left untreated because of budget limitations, was trapped on a 250 meter grid. Only three traps were positive, each with one moth per trap. Also, of note were six positive traps, each with one moth per trap, out of 22 set within one mile of Support Operations. No alternate lifestages have been found.

Gypsy Moth Trapping Data

County		Traps			Total Catch	Positive Traps
FIPS	Name	Total	STS	Statewide		
1	ALAMANCE	230	182	48	15	15
3	ALEXANDER	74	0	74	0	0
5	ALLEGHANY	319	319	0	16	16
7	ANSON	150	0	150	1	1
9	ASHE	171	86	85	9	8
11	AVERY	55	0	55	0	0
13	BEAUFORT	253	0	253	40	34
15	BERTIE	388	339	49	133	93
17	BLADEN	264	0	264	1	1

19	BRUNSWICK	310	0	310	1	1
21	BUNCOMBE	127	0	127	4	4
23	BURKE	271	0	271	3	3
25	CABARRUS	107	0	107	7	6
27	CALDWELL	126	0	126	0	0
29	CAMDEN	174	174	0	7	7
31	CARTERET	124	0	124	5	5
33	CASWELL	280	280	0	328	133
35	CATAWBA	124	0	124	0	0
37	CHATHAM	222	0	222	2	1
39	CHEROKEE	86	0	86	0	0
41	CHOWAN	119	119	0	20	19
43	CLAY	44	0	44	1	1
45	CLEVELAND	138	0	138	2	2
47	COLUMBUS	257	0	257	2	1
49	CRAVEN	194	0	194	42	34
51	CUMBERLAND	196	0	196	0	0
53	CURRITUCK	277	277	0	43	28
55	DARE	155	13	142	41	25
57	DAVIDSON	166	6	160	3	3
59	DAVIE	94	29	65	2	1
61	DUPLIN	244	0	244	23	21
63	DURHAM	157	113	44	42	27
65	EDGECOMBE	196	68	128	103	62
67	FORSYTH	313	270	43	31	29
69	FRANKLIN	292	261	31	128	87
71	GASTON	102	0	102	0	0
73	GATES	237	237	0	47	32
75	GRAHAM	57	0	57	0	0
77	GRANVILLE	385	385	0	196	139
79	GREENE	79	0	79	27	20
81	GUILFORD	358	297	61	32	27
83	HALIFAX	493	493	0	165	125
85	HARNETT	173	0	173	3	3
87	HAYWOOD	176	0	176	1	1
89	HENDERSON	138	0	138	0	0
91	HERTFORD	229	229	0	70	57
93	HOKE	109	0	109	0	0
95	HYDE	172	0	172	17	15
97	IREDELL	176	0	176	4	4
99	JACKSON	182	0	182	0	0
101	JOHNSTON	241	0	241	65	37
103	JONES	115	0	115	10	9
105	LEE	77	0	77	0	0

107	LENOIR	112	0	112	32	24
109	LINCOLN	86	0	86	2	1
113	MACON	101	0	101	10	9
115	MADISON	92	0	92	0	0
117	MARTIN	129	14	115	33	31
111	MCDOWELL	105	0	105	0	0
119	MECKLENBURG	162	0	162	2	2
121	MITCHELL	51	0	51	0	0
123	MONTGOMERY	129	0	129	0	0
125	MOORE	207	0	207	0	0
127	NASH	248	145	103	140	94
129	NEW HANOVER	68	0	68	3	2
131	NORTHAMPTON	362	362	0	134	109
133	ONSLOW	185	0	185	58	27
135	ORANGE	218	178	40	67	38
137	PAMLICO	88	0	88	7	6
139	PASQUOTANK	156	156	0	9	8
141	PENDER	226	0	226	21	15
143	PERQUIMANS	176	176	0	13	13
145	PERSON	260	260	0	449	195
147	PITT	245	0	245	76	61
149	POLK	59	0	59	0	0
151	RANDOLPH	225	0	225	4	4
153	RICHMOND	151	0	151	0	0
155	ROBESON	276	0	276	1	1
157	ROCKINGHAM	415	415	0	155	109
159	ROWAN	139	0	139	1	1
161	RUTHERFORD	157	0	157	1	1
163	SAMPSON	287	0	287	20	18
165	SCOTLAND	90	0	90	1	1
167	STANLY	113	0	113	0	0
169	STOKES	369	369	0	141	99
171	SURRY	491	491	0	52	44
173	SWAIN	43	0	43	0	0
175	TRANSYLVANIA	69	0	69	0	0
177	TYRRELL	99	0	99	1	1
179	UNION	179	0	179	1	1
181	VANCE	210	210	0	54	44
183	WAKE	274	24	250	87	58
185	WARREN	334	334	0	98	66
187	WASHINGTON	101	0	101	0	0
189	WATAUGA	79	0	79	0	0
191	WAYNE	156	0	156	66	42
193	WILKES	289	104	185	9	9

195	WILSON	121	0	121	59	39
197	YADKIN	179	137	42	1	1
199	YANCEY	71	0	71	0	0
	Totals	**18,578**	**7,552**	**11,026**	**3,500**	**2311**

Nursery Certification Program

Nursery Summary by Category:

	Category	Number of Nurseries	Acreage
•	Retail	116	711.5
•	Wholesale	227	6,147.3
•	Retail and Wholesale	970	11,532.6
•	Institutional*	68	75.8
•	Registered**	271	140.8
	Totals	**1,652**	**18,608.0**

Collected Plant Certificates Issued - 77

Number of Nursery Dealers - 2,346

Stop Sale / Rejection Notices Issued - 8

* Institutional nursery – a nursery owned or operated by any governmental agency.
** Registered nursery – any nursery less than one acre in size that produces but does not distribute or sell nursery stock outside the state.

Nursery Program-Computer Support
The Plant Protection Section routinely issues compliance agreements between NCDA&CS, USDA and businesses that address their willingness to adhere to certain stipulations and regulations in the movement of commodities. An old database existed in which these agreement forms were created and the information stored. This database needed to be updated and made more functional. NCDA&CS' Plant Industry Division staff was able to overhaul this program, to add in new and needed information and to make form creation and storage easier.

Phytosanitary Certification Program

Within the Export Certification Program, Plant Protection Specialists issue phytosanitary certificates to growers and/or brokers to facilitate movement of agricultural commodities to other states and countries. Phytosanitary certificates indicate inspections and other specific requirements of the importing states and countries have been fully met. State certificates are used for movement within the U.S., and federal certificates are required

for movement to another country. Countries and states vary greatly in what they require for various types of commodities such that careful research and interpretation of requirements are needed for each request for phytosanitary certification. The majority of the certificates were issued during 2007, were for lumber, tobacco, cotton, cotton seed, peanuts, nursery and greenhouse plants, sweetpotatoes, and sweetpotato cuttings. Two Export Certification Specialists, one field based and one based in Raleigh, provide management and administrative oversight for the Export Certification Program.

Summary of Certificates issued in 2007 by Category:

Category	Number Issued
Federal Certificates	
Phytosanitary Certificate	1,397
Re-Issue Certificate	96
Re-Export Certificate	35
Processed Product Certificate	64
State Certificates	
Phytosanitary Certificates	328

Plant Protection Specialists utilized the newly implemented computer-based USDA Phytosanitary Certificate Issuance and Tracking System (PCIT) to issue 624 of the Federal certificates issued in 2007. The PCIT system provides security, reporting functions, and monitoring capabilities for issuing phytosanitary certificates for exported commodities. Utilization of the PCIT system for issuing phytosanitary certificates will increase in 2008.

Plant Conservation Program (PCP)

Grants & Agreements

Natural Heritage Trust Fund (NHTF)

In 2007, the PCP obtained $6,580,000 for acquisition of Plant Conservation Preserves in North Carolina. The awarded NHTF grants are as follows:

	Received
Schulkens Savanna	$ 716,000
Dulany Bog Plant Conservation Preserve	$ 650,000
Stolting tract – Eastwood Plant Conservation Preserve	$ 500,000
Tufts tract – Eastwood Plant Conservation Preserve	$1,300,000
Boiling Spring Lakes Plant Conservation Preserve	$ 500,000
Cedar Cliff Plant Conservation Preserve	$ 880,000
Hebron Road Plant Conservation Preserve	$ 625,000
Eason tract addition – Tater Hill Plant Conservation Preserve	$1,409,000
Total	$6,580,000

Traditional Section 6 Agreements – U.S. Fish and Wildlife Service (USFWS)
The USFWS Cooperative Agreement continues to provide critical support for the Plant Conservation Program.

In 2007, the PCP completed work and final reports on two funding segments of this agreement. Funding supported staff efforts to monitor the status of focal species at selected Plant Conservation Preserves, identify species and site protection priorities statewide, participate in a number of collaborative conservation efforts, manage and restore habitat at existing Plant Conservation Preserves, support the regulatory aspects of the Program, and to configure, upgrade, and repair existing equipment.

Administrative Items

Program Capacity
Throughout 2007, the NCDA&CS' Plant Conservation Program continued to operate with a single full-time state supported position. The USFWS Cooperative Agreement supported two additional permanent positions during 2007. A mixture of grants funded one temporary staff member for a portion of the year.

NCDA&CS' Plant Industry Division Support
During 2007, the Program received an unprecedented amount of support from other Plant Industry Division employees. This support was instrumental in helping PCP to implement some of the many and varied land management tasks that exist on Plant Conservation Preserves.

Multi-Agency Partnership Projects & Public Outreach
PCP is an official member and contributor to several Conservation Partnerships, each of which involved PCP staff activity or participation during 2007. These include the Greater Uwharrie Conservation Partnership (GUCP), Cape Fear Arch Conservation Collaborative, Onslow Bight Fire Learning Network, Penny's Bend Advisory Committee, North Carolina Prescribed Fire Council, and the Sandhills Area Conservation Partnership. In addition, staff assisted the U.S. Army Corps of Engineers and the Eno River Association with management activities

Staff participated in a number of meetings that have helped to expand awareness of the Program's mission. Audiences that were reached through such meetings included: medicinal plant industry representatives, enthusiasts, growers, diggers, representatives of many Land Trusts in North Carolina, NCDA&CS' Plant Protection Specialists, staff for several North Carolina counties, environmental professionals and consultants, land trust representatives from around North Carolina, and representatives of various state and federal agencies and academic institutions, including State Parks, Wildlife Resources Commission (WRC), Department of Forest Resources (DFR), National Heritage Program (NHP), Division of Water Quality (DWQ), North Carolina Zoo (NCZ), North Carolina State University (NCSU), and others from around the nation.

To improve public outreach and interface, staff designed a new look and new content for the Program website (www.ncplant.com). Part of the expanding content will include more information on protected plant species, as well as habitat and Preserve information.

Regulatory Programs

Regulatory Changes
In 2007, PCP staff initiated a systematic review and update of the regulations governing all program aspects. Review of the regulations and frequent consultation with the NCDA&CS' legal council, Scientific Committee members, and Board members has been ongoing. PCP staff hopes to complete the regulation review in 2008.

Protected Plant Status
No changes were made to the North Carolina protected plant list in 2007. There are currently 164 species and varieties on the protected plant list; 27 of these are also federally listed under the Endangered Species Act.

Permit Application and Review Process
In previous years, there was little coordination between the Plant Conservation Program, the U.S. Fish and Wildlife Service (USFWS) and the North Carolina Natural Heritage Program (NHP) in regards to issuing permits for protected plant species. This became problematic when federal permits were not consistent with permits issued by PCP or when plants were moved, but data was never adequately recorded. During 2007, the Plant Conservation Program formally coordinated with interagency partners with overlapping regulatory responsibilities on pertinent projects.

Permits Issued
Approximately 100 permits were reviewed and issued during 2007. Activities included under permit were reintroduction, research, rescue, propagation, sale, Preserve access, and collection.

Ginseng Harvest
Ginseng is a Special Concern species in North Carolina and as such is subject to international CITES provisions. During 2007, PCP continued to manage data on the ginseng trade in North Carolina including reported harvest quantities, and issued legally required dealer certificates.

Data from the 2006 harvest season was entered, totaled and prepared for the annual ginseng report to the U.S. Fish and Wildlife Service (Division of Scientific Authority). The total amount of wild ginseng collected from North Carolina totaled 6,760 pounds for the 2006 harvest season.

During the fall of 2007, a total of 50 dealer licenses were issued to buy and export ginseng from North Carolina. This represents an increase from previous years.

Additionally, this year is proving to be an exceptional year for ginseng since the price was higher than it has been in several decades. Ginseng sold at an average of $800/lb during the fall of 2007. The current ginseng season ends on March 31, 2008; therefore, it is not possible to determine if the number of pounds of wild ginseng has increased, decreased, or remained stable this season until after this date.

2007 Plant Conservation Preserve Status

Bat Fork & Ochlawaha Bogs (Henderson Co.)
No 2007 changes
Existing Preserve Size = ~ 28 acres, approximate Cost – $198,000
NHTF grants: 1996, 1998, and 1999.
Acquisition plan: 5 additional tracts

Tater Hill (Watauga Co.)
Expansion funded in 2007
Existing Preserve Size = ~ 927 acres, approximate Cost – $ 2,994,558
NHTF grants: 2000, 2002, 2005, 2006, and 2007
Acquisition plan: 5 additional tracts

Paddy Mountain (Ashe Co.)
No 2007 changes
Existing Preserve Size = 263 acres, approximate Cost - $ 551,338
NHTF grants: 2002, 2003
Acquisition plan: 2 additional tracts

Melrose Mountain (Polk Co.)
No 2007 changes
Existing Preserve Size = 318 acres, approximate Cost - $ 640,000
NHTF grant: 2004 (with EEP match)
Acquisition plan: NA, revision needed

White Oak Mountain (Polk Co.)
Established in 2007
Existing Preserve Size = 125 acres, approximate Cost - $ 1,325,000
NHTF grant: 2006
Acquisition plan: 1 tract

Cedar Cliff (Jackson Co.)
Authorized & funded in 2007. To be established in 2008.
Acquisition plan: NA

Dulany Bog (Jackson Co.)
Authorized & funded in 2007. To be established in 2008.
Acquisition plan: NA

Eno River Diabase Sill (Durham Co.)
Small expansion in 2007, 2 closings pending in 2008
Existing Preserve Size = ~ 225 acres, approximate Cost – ~$1,803,600
NHTF grants: 2003, 2004, 2005, 2006
Acquisition Plan: 4 tracts

Hebron Road (Durham Co.)
30 acre expansion funded in 2007
Existing Preserve Size = ~ 30 acres, approximate Cost – $ 904,650
NHTF grant: 2006
Acquisition Plan: NA

Harvest Field (Randolph Co.)
Existing Preserve Size = ~ 30 acres
Approximate Cost – $ 180,000
Funded by NHTF grant (2005)
Acquisition Plan: NA

Long Mountain/Poison Fork (Randolph Co.)
No 2007 changes
Existing Preserve Size = 233 acres, approximate Cost - $ 301,000
NHTF grant: 2004 (> 50% match from Clean Water Management Trust Fund)
Acquisition Plan: NA

Denson's Creek (Montgomery Co.)
No 2007 changes
Existing Preserve Size = 190 acres , approximate Cost - $ 230,000
NHTF grant: 2001 (with matching Clean Water Management Trust Fund)
Acquisition Plan: NA

Pondberry Bay (Sampson Co.)
No 2007 changes
Existing Preserve Size = ~ 2,100 acres, approximate Cost – $1, 545,000
NHTF grant: 2001
Acquisition Plan: NA

Boiling Spring Lakes (Brunswick Co.)
Expansion in 2007, additional funding in 2007
Existing Preserve Size = ~ 6,300 acres, approximate Cost – $ 3,000,000
NHTF grants: 1999, 2000, 2003, 2007
Acquisition plan: none, however, PCP has recently prioritized nearly 100 individual private parcels within Management Areas 10, & 22. These properties will be pursued for acquisition under partnership with TNC.

Hog Branch Ponds (Brunswick Co.)
No 2007 changes
Existing Preserve Size = 514 acres, approximate Cost – $1,000,000
NHTF grant: 2004 (EEP match)
Acquisition plan: none, however, PCP has recently prioritized a few remaining in holdings to complete desired ownership (Management Area 2). These properties will be pursued for acquisition under partnership with TNC.

Big Pond Bay (Cumberland Co.)
No 2007 changes
Existing Preserve Size = 75 acres, approximate Cost - $ 115,000
NHTF grant: 2005 (EEP match)
Acquisition plan: 5 additional tracts

Eastwood (Moore Co.)
New Acquisition Funds and ~46 acre expansion in 2007
Existing Preserve Size = 170 acres, approximate Cost - $ 1,760,000
NHTF grants: 2006, 2007
Acquisition plan: 10 additional tracts, it appears that 3 of these may be unavailable or lost permanently to development

2007 Plant Conservation Site Acquisition Plan

Following a formalized land acquisition review and approval process, a number of additional sites and tracts were added to the North Carolina Plant Conservation Board approved acquisition plan. Tracts proposed for addition to existing PCP Preserves are summarized in the preceding section. The list below includes newly proposed Significant Natural Heritage Area (SNHA) along with the primary plant target(s) for which the site was identified as an acquisition priority.

Lobelia boykinii	Antioch Bay Complex
Rhus michauxii	Antioch Bay Complex
Rhexia aristosa	Antioch Bay Complex
Amphicarpum muehlenbergianum	Antioch Bay, McIntosh Bay, Pretty Pond
Schisandra glabra	Armstrong Ford
Shortia galacifolia var. brevistyla	Bear Creek
Plantago sparsiflora	Big Neck Road at Millpond Bay
Portulaca smallii	Bog Flatrock
Isoetes piedmontana	Bog Flatrock
Lindera subcoriacea	Bonnie Doone Natural Area
Myriophyllum laxum	Bonnie Doone Natural Area
Pyxidanthera barbulata var. brevifolia	Bonnie Doone Natural Area

Rhynchospora macra	Bonnie Doone Natural Area
Parnassia grandifolia	Bryant Mill (Greenbank) Bluff
Poa paludigena	BUFFALO CREEK BOG REMNANT
Macbridea caroliniana	Camp Branch Savanna Remnant
Parnassia caroliniana	Camp Branch Savanna Remnant
Spiranthes longilabris	Camp Branch Savanna Remnant
Thalictrum cooleyi	Camp Branch Savanna Remnant
Sporobolus teretifolius	Camp Branch Savanna Remnant
Lindera subcoriacea	Camp Rockfish
Sarracenia jonesii	Cedar Mountain Bog
Sisyrinchium dichotomum	Cherry Mountain
Solidago villosicarpa	Clarks Landing Coastal Goldenrod Site
Portulaca smallii	County Line Flatrocks
Parnassia caroliniana	Crusoe Island Savanna
Sporobolus teretifolius	Crusoe Island Savanna
Symphyotrichum georgianum	Falls Dam Slope
Paronychia herniarioides	Green Pond Bay Rim
Sedum pusillum	Hightower Hill
Macbridea caroliniana	Howell Woods
Isoetes piedmontana	Island Ford Flatrocks
Minuartia uniflora	Island Ford Flatrocks
Minuartia uniflora	Jenkins Flatrock
Isoetes piedmontana	Jenkins Flatrock
Orthotrichum keeverae	Joe/Little Joe Mountains
Pellaea wrightiana	Joe/Little Joe Mountains
Lindera subcoriacea	Juniper Springs Church Natural Area
Utricularia resupinata	Lake Waccamaw Aquatic Habitat
Adiantum capillus-veneris	Lake Waccamaw Aquatic Habitat
Lilium grayi	Linville Gap Bog
Poa paludigena	Linville Gap Bog
Orthotrichum keeverae	Little Mountain
Stylisma pickeringii var. pickeringii	Little River Flatwoods
Rhexia aristosa	Mcintosh Bay Complex
Lobelia boykinii	Mcintosh Bay Complex
Oxypolis canbyi	Mcintosh Bay Complex
Sedum pusillum	Millseat Outcrop
Stylisma pickeringii var. pickeringii	Natmore Sandhills
Parnassia grandifolia	Neils Eddy Landing
Lindera melissifolia	Newkirk Tower Carolina Bay
Stylisma pickeringii var. pickeringii	Northwest Garland Sandhills and Streamheads
Rhexia aristosa	Oak Savanna Bay
Muhlenbergia torreyana	Oak Savanna Bay

Packera schweinitziana	Ogle Meadows
Lilium grayi	Phoenix Mountain
Houstonia montana	Phoenix Mountain
Parnassia grandifolia	Phoenix Mountain
Lilium grayi	Pineola Bog
Thelypteris simulata	Pineola Bog
Solidago verna	Richmond Mill
Portulaca smallii	Rock Grove Church Granite Outcrops
Packera millefolium	Rockey Face Mountain and Cedar Knob
Lysimachia asperulifolia	Rosindale Longleaf Pine Forest
Minuartia uniflora	Sandy Mush Outcrop
Isoetes piedmontana	Sandy Mush Outcrop
Lilium grayi	Savannah Church Bog and Seep
Quercus ilicifolia	Simms Hill/Little River Uplands
Thelypteris simulata	Skunk Cabbage Bogs
Parnassia grandifolia	Sparta Bog
Lilium grayi	Sparta Bog
Lobelia boykinii	Stateline Prairie Bay
Tridens ambiguus	Stateline Prairie Bay
Rhexia aristosa	Stateline Prairie Bay
Lilium grayi	Sugar Mountain Natural Area
Minuartia godfreyi	Sweetwater Creek/Trent River Natural Area
Camassia scilloides	Tar River Camassia Slopes
Parnassia caroliniana	Waccamaw River Ridge-and-Swale Boggy Openings
Sarracenia minor	Waccamaw River Ridge-and-Swale Boggy Openings
Muhlenbergia torreyana	Waccamaw River Ridge-and-Swale Boggy Openings
Sporobolus heterolepis	Webster Serpentine-Olivine Outcrop
Lilium pyrophilum	Wiregrass Road Powerline
Packera millefolium	Yellowtop/Biggerstaff Mountain
Trillium pusillum var. pusillum	Watkins Savanna
Parnassia caroliniana	Watkins Savanna
Rhynchospora thornei	Watkins Savanna
Thalictrum cooleyi	Watkins Savanna

In addition, the site acquisition plan includes the following sites and tracts carried over from 2006:

Knap of Reeds SNHA (Granville Co.)
Portion of the site is under cooperative PCP/USACOE management. PCP acquisition plan includes one tract which is known to support a portion of the Smooth Coneflower (*Echinacea laevigata*) population. This "State Prison tract" is assigned to the Department of Corrections which constructed a youth prison facility on a portion of the property. PCP would like to secure transfer of remaining portions of the property

Rocky Point Marl Forest (SNHA) (Pender Co.)
PCP acquisition plan includes two core tracts at this unprotected site. The Coastal Land Trust has been made aware of PCP's interest in the property and has apparently initiated some contact with the landowner – status unclear.

Schulkens Savanna (SNHA) (Columbus Co.)
PCP acquisition plan includes properties formerly owned and managed by Plum Creek Timber Company, representing the core of the SNHA. PCP has worked with a private individual, TNC, NHP, and the State's Property Office to try and arrange a deal to purchase this property. PCP obtained a $715,000 land acquisition grant to purchase approximately 300 acres of the property. Plum Creek wanted to retain timber rights on all acres but agreed to sell; they subsequently logged a portion of the area. Timber value was an essential part of the State appraised value and will not "donate" timber to Plum Creek. PCP has secured a new timber assessment from NCSU that has been provided to the State's Property office for renegotiation – status unclear.

Carolina Bays Miscellaneous SNHA's (various coastal plain Cos.)
PCP acquisition plan includes key tracts at the following SNHA's :
Arabia Bay, Blueberry Bay, Dial Bay, Hamby's Bay, and Hidden Bay.

Caraway Mountain (SNHA) (Randolph Co.)
PCP acquisition plan included two properties that supported Schweinitz's Sunflower. NCDOT mitigation money and NC ZOO interest precluded the need for PCP to take ownership.

Cooley's Meadow Rue Type Locality SNHA (Onslow Co.)
Acquisition plan includes the "Cottle tract" – no progress with landowner contacts

East Flat Rock Bog Remnant (Henderson Co.)
"Hyder Pasture tract" is the only tract at site included on the PCP acquisition plan. CMLC is aware that PCP had expressed interest in the property, which had sold relatively recently. CMLC was originally proposing a complex trade of easement if the landowner could gain additional development rights on other portions of the tract. The tract was apparently discussed by regional partners – current status unknown.

Jonasee Rock/ThreeTop Mountain SNHA (Ashe Co.)
PCP acquisition plan includes several properties along the eastern end of this SNHA (the western most portions are in protected status by NCWRC primarily) – no progress has been made.

King Creek Bog (Henderson Co.)
"Swing tract" & "Cope/Edney tract" – only tracts at site included on the PCP acquisition plan. CMLC and other potential partners are aware that PCP had expressed interest in the property. Like East Flat Rock, the site is included in ongoing development plans – current status unclear.

South Butner Diabase Glade SNHA (Granville Co.)
Property currently in state ownership, but administered by non-conservation agency. PCP is proposing possible transfer of management authority.

Suffolk Scarp Bog SNHA) (Beaufort Co.)
PCP acquisition plan includes corporate property consisting of the core of this SNHA. TPL has been made aware of PCP's interest and was expected to take the lead on a landowner contact – no progress has been made.

421 Sand RIdge (SNHA) (New Hanover Co.)
PCP acquisition plan includes several properties (mostly corporate owned) that represent the core of the SNHA – no progress with landowner contacts.

Plant Conservation Stewardship and Management

Equipment Procurement
The Program obtained much needed equipment to support land management efforts on Plant Conservation Preserves. PCP sought out surplus and used equipment to conserve limited funds. The following items were obtained:

A low ground pressure bulldozer for installing and maintaining fire lines.

A semi-truck road tractor and lowboy trailer needed to haul the dozer (all purchased from state surplus). Each of these items needed significant repair and maintenance. For example, the lowboy had to be completely re-decked; several links on the bulldozer track had to be replaced, while the semi-truck needed new tires and a fuel pump.

In addition, staff obtained a heavy duty used pickup truck for use as a fire engine/water pumper. This truck had to be completely reconfigured and rebuilt.

An all terrain 4wd vehicle ("Gator") was purchased for use on fire lines and mop up after prescribed fires. A water tank, pump, and hose reel were added to the bed, along with fire tool brackets.

Preserve Management

Bat Fork & Ochlawaha Bogs Plant Conservation Preserve (Henderson Co.)
(1) PCP had numerous discussions with NHP staff regarding the location of significant targets, and management issues facing the Preserve.

Big Pond Bay Plant Conservation Preserve (Cumberland Co.)
(1) PCP, NHP, and USFWS conducted a site visit to map and estimate the population status of Pondberry *(Lindera melissifolia)* present. Documentation was also made of several individuals of Pondspice (*Litsea aestivalis*), a significantly rare species in

North Carolina. Some Pondberry plants were noted on adjacent private lands which could be acquisition target in the future.

Boiling Spring Lakes Plant Conservation Preserve (Brunswick Co.)

(1) PCP held numerous meetings with TNC staff regarding prescribed fire priorities and management issues Preserve-wide.
(2) PCP contracted with the North Carolina Department of Environment and Natural Resources, Division of Forestry (NCDENR FS) and TNC to burn approximately 1,500 acres on the Preserve this winter at a cost of nearly $13,000.
(3) NCDENR FS completed a 900+ acre burn on the Preserve; due to wet conditions the burn was incomplete. Although a reattempt was scheduled, drought conditions made such a plan impossible.
(4) At least four wildfires occurred on the Preserve. PCP staff met with NCDENR FS' staff related to suppression and rehabilitation efforts as well as cooperative projects to reduce fuel loads in key portions of the Preserve.
(5) PCP has targeted several management blocks on the Preserve for fuel reduction burning and began planning to implement necessary fire lines and burns; due to previously mentioned drought conditions these plans were interrupted.
(6) PCP and NCDA&CS' staff briefed TNC and NHTF Board representatives on the status and future of the BSL project.
(7) PCP has been preparing an acquisition plan, based on available data, additional field visits, and communication with TNC, NHP, and others.
(8) PCP had several meetings with NRCS and WRC concerning potential funding for management activities on the Preserve.

Corps of Engineers' Coneflower sites (Granville Co.)

(1) PCP installed fire lines around two rare plant sites featuring Coneflower (*Echinacea laevigata*) populations.
(2) PCP staff assisted and supported the Core of Engineers' (COE) staff on prescribed fires at both sites.

Denson's Creek Plant Conservation Preserve (Montgomery Co.)

(1) PCP established 12 new seedling plots for Schweinitz's sunflower. Seeds were collected the previous year from mother plants originally from the site. These plots were raked to mineral soil with all leaf litter and debris removed.
(2) PCP removed sweetgum and maple stems in and around new seed plots.
(3) PCP Staff met with USFWS and NCWRC representatives to discuss management goals and objectives on the Preserve
(4) USFWS and PCP transplanted sunflowers to a portion of the Preserve.
(5) A WHIP contract was applied for to support management of this Preserve.
(6) PCP implemented prescribed fire on April 3, 2007.

Eastwood Plant Conservation Preserve (Moore Co.)

(1) PCP staff and NHP made numerous visits to the Preserve to review various ownership and management issues, including meeting with nearly all adjoining private landowners and neighbors.
(2) Staff reviewed and granted research requests that include work on the Preserve

Eno River Diabase Sill Plant Conservation Preserve (Durham Co.)

(1) Staff met with Natural Heritage Program to begin the process of permanently dedicating this Preserve for conservation.
(2) Staff met with NCWRC's Technical Assistance biologist to discuss management ideas and options on the Preserve.
(3) PCP met with a representative of the Occaneechi Saponi Indian tribe to discuss collaborative management at the Preserve.
(4) Staff removed small infestations of Queen Anne's Lace, Sericea Lespedeza, Mimosa, Microstegium and Johnson Grass from the Preserve.
(5) PCP implemented prescribed fire on Harrelson tract (~16 acres) with the help of two other Divisional staff and two volunteers on March 23.
(6) Two gates were installed along main access points into the Preserve.
(7) PCP, NCDA&CS' Weed Specialist, and a herbicide company representative held a field meeting on the Preserve to discuss fescue grass control options. BASF donated Plateau® herbicide for use on the site.
(8) PCP staff sprayed approximately two acres of fescue on a portion of the Preserve
(9) PCP worked with NCDOT on the placement of "Do Not Mow" signs adjoining the Preserve.
(10) Protective fencing was installed to protect a coneflower subpopulation from incidental damage by neighbors
(11) Staff thinned above and removed brush around one of the coneflower populations.
(12) PCP and NCDA&CS' employees conducted a prescribed burn on a previously unburned portion of the Preserve.
(13) Native seed plots (five species) were established by raking to expose bare soil and covering seeds with wire mesh to prevent predation.
(14) Photo monitoring plots were revisited and updated.
(15) Volunteer day trash cleanup was conducted.

Harvest Field (Randolph Co.)

(1) Staff conducted site management planning visit with primary emphasis on prescribed fire implementation issues.
(2) Schweinitz's sunflowers along the property margin were sprayed with deer repellant.
(3) Staff worked with NRCS and NCWRC on a WHIP application to support future management activities on the Preserve.

Hebron Road (Durham Co.)

(1) PCP removed tree saplings and sprouts along the roadside portion of the site (where most of the rare plants have been known to persist) with heavy mower.
(2) Large debris and "mulch" resulting from mowing was removed by hand with both leaf blowers and fire rakes.
(3) Staff marked "leave" trees along much of the property boundary in advance of thinning operations.
(4) A portion of the site was selected for an equipment demonstration that included removal of some of the non-desirable competing vegetation.
(5) Select herbicide application was conducted along margins of the site to control Sericea Lespedeza.
(6) Rare plant seedling plots were installed in several locations.
(7) Several site visited to monitor Preserve and rare plant status. One such trip resulted in identification of illegal trespass and dumping. The responsible party was located and agreed to hand remove the offending debris.
(8) Prescribed fire planning was initiated and several contacts have been made to begin removing one of the existing site fire hazards.

Hog Branch Ponds Plant Conservation Preserve (Brunswick Co.)

(1) PCP staff and NCDA&CS' Divisional employees completed hand cutting of 50-acre loblolly pine plantation in preparation for replanting to longleaf pine. Meeting was held with NRCS agent to review this work.
(2) PCP conducted prescribed fires on approximately 130 acres.
(3) PCP has attempted to gain NCDFR assistance in securing a fire line around one potential burn unit to ready it for prescribed fire. Due to other priorities and constraints this activity was not completed and held up management efforts.

Long Mountain/Poison Fork (Randolph Co.)

(1) PCP collaborated with NHP staff regarding permanent dedication of this Preserve for conservation.
(2) Staff discussed Preserve management goals and issues with NCWRC.

Melrose Mountain (Polk Co.)

(1) PCP conducted site visit with NHP to support dedication of the Preserve as permanent conservation land.

Paddy Mountain (Ashe Co.)

(1) Several site visits were conducted to monitor Preserve status; no problems or issues were noted.
(2) PCP enlisted two additional NCDA&CS' employees to assist with routine monitoring.
(3) Main Preserve access control point was updated with more substantial locks.
(4) Several researchers visited the Preserve under permit issued by PCP.

(5) PCP and TNC held a Preserve coordination discussion to clarify roles and responsibilities. Previously, TNC was informally monitoring and managing the Preserve.

Pondberry Bay Plant Conservation Preserve (*Sampson Co.*)

(1) Prescribed burn was conducted. Results have gained positive attention from other partners including the Division of Forest Resources (DFR) and Natural Heritage Program (NHP) and produced impressive results on-the-ground.
(2) Extensive planning for additional burns was conducted; most of these plans were interrupted by the severe drought.
(3) A multi-agency/volunteer clean up day was conducted. One illegal trash dumper was identified and prosecuted.
(4) A tentative agreement with Waste Industries, Inc., of Sampson County (our neighbor to the east) was made to remove logging chip piles (fire hazards) from site. Consultation with NHP over this activity occurred.
(5) A WHIP contract was applied for to support management efforts at this Preserve.
(6) Extensive planning and meetings have gone into establishing experimental management plots to determine how fire affects the key conservation target at the Preserve.
(7) Staff located a large infestation of Bamboo that will be removed in the future.

Rocky Point Marl Forest (SNHA)

(1) PCP staff conducted a joint work day with NHP staff to remove Chinese Privet from portions of the site (which is an acquisition target of PCP). It is hoped that workdays will help build a relationship with the landowners and lead toward eventual long term protection of the site, as well as remove one of the main threats to the site.

Tater Hill Plant Conservation Preserve (*Watauga Co.*)

(1) Staff and program volunteers monitored the status of beaver activity, which began in 2006, in and around the core mountain bog habitat at this Preserve. The flooding caused by the beaver activity has the potential to affect a number of rare species including one of only three sites in North Carolina for *Ilex collina.*
(2) Staff met with and consulted with various experts regarding the beaver situation and explored the various beaver control strategies that may be possible. By the end of the project cycle, beaver activity appeared to have ceased, although residual flooding is still present.
(3) Staff conducted extensive review of a proposed research project that involved drilling deep water wells on the Preserve. It was determined that the project was not likely to adversely affect any of the critical resources on the Preserve. A Memorandum of Understanding between NCDA&CS' Plant Industry Division, Plant Conservation Program and NCDENR, Division of Water Quality, Aquifer Protection Section has been fully executed. PCP is currently processing the permits.
(4) Staff held on-site meeting with volunteer to discuss monitoring and management ideas for Gray's Lily.

(5) Meetings were held with several neighbors regarding illegal vehicle use inside the Preserve.
(6) PCP and NCDA&CS' staff reviewed the extent of interior road usage and began mapping locations and setting a control strategy.
(7) Illegal trespass situation dealt with in conjunction with local law enforcement.
(8) PCP met with NHP on-site to review the status of two most recent tract purchases and begin process for permanent dedication of these areas for conservation.
(9) Brief tour of the Preserve was conducted for NHTF Board members prior to their Fall 2007 meeting.

White Oak Mountain (Polk Co.)

(1) PCP staff met with USFWS and NCDOT to assist in transplanting rescued plants to the Preserve.
(2) Staff conducted several Preserve management reconnaissance and planning trips to the site.
(3) Staff have begun prescribed fire planning for a portion of the site.
(4) Small amounts of two exotic, invasive species were removed.

Scientific/Botanical Issues

Protected Plant Prioritization

In 2007, PCP staff, partners, and Scientific Committee began a reassessment of the philosophy, definitions, and process for listing protected plant species in North Carolina. The goals for reassessment were to ensure the listing status is scientifically and legally defensible, consistent with other species with similar threats, trends and numbers of populations, and useful for setting conservation priorities, and readily explainable to the public. Revised listing criteria were developed based on revised IUCN-based (World Conservation Union) listing methodology, and expert opinion on threats and trends for each species. Factors that make up the formula for this listing process include adequacy of existing scientific data to assess imperilment, Federal listing status, the total number of populations in North Carolina, the total number of populations in North Carolina with projected good viability, short term trends, threats (including severity, scope, and immediacy), and other considerations.

The Scientific Committee met March 7, June 6, June 20, July 16, and August 23, 2007, to specifically discuss this topic. One of the outcomes is a proposal to use different listing categories or operational definitions of existing categories: Endangered, threatened, Special concern-vulnerable, and Special concern-historic. New regulations for the new special concern categories have not yet been proposed.

PCP staff met with experts statewide to assess the short term population trends and threats to each rare species. The threats (including the level of severity, scope, and immediacy) and short term trends (whether increasing, stable, declining, rapidly declining, etc.) were identified and evaluated. Up to this point, 723 out of 901 species

have been assessed. PCP staff hopes to finish the assessments by the beginning of summer 2008.

Venus Flytrap Marking Program

PCP organized the second annual Venus Flytrap dye-marking effort in June 2007, with the purpose of deterring poaching on otherwise protected lands at Boiling Spring Lakes Plant Conservation Preserve and the Green Swamp TNC Preserve. Results included over 1,100 plants marked at the Boiling Spring Lakes Preserve, 452 in the Cow Island area of The Green Swamp, and many thousands of plants in Shoestring Savanna of the Green Swamp. Participants included eleven NCDA&CS' staff and nine TNC staff over the course of two days. Reporters from the Audubon Magazine, National Geographic, and the State Port Pilot also participated.

Ginseng Marking Program

In August 2007, PCP staff participated in the 11th annual ginseng marking blitz in the Great Smoky Mountain National Park, an area that is notoriously known for poaching ginseng on protected land. Volunteers from NCDA&CS, The National Park Service, and USDA marked 1,627 plants in 3 days, covering over 23 miles of the park. A number of poachers were caught this year with marked plants.

Schweinitz's Sunflower Monitoring

PCP collected data on six subpopulations of *Helianthus schweinitzii* known to occur at the Denson's Creek Plant Conservation Preserve. Data recorded included the number of clumps, the number of stems per clump, the number of flowering stems per clump, if the stem was less than 10 cm tall, or if browsing was evident on each clump. Overall, the species is still not thriving or expanding as planned for on this Preserve.

Pondberry Monitoring

Lindera melissifolia (Pondberry) is a federal and state endangered species. In North Carolina, there are only four extant populations and the two highest ranked populations receive some protection on Plant Conservation Preserves managed by the Plant Conservation Program. In 2007, PCP began collecting data and observations to support appropriate management decisions at one of these Preserves. The initial objective was to estimate the size of the population present, since detailed and reliable estimates at the site do not exist. After significant reconnaissance, it was determined that a complete census was impossible. The second objective is examining the effects of controlled experimental treatments on a subset of the population. Permanent monitoring plots were established that represented a range of conditions from full sun to dense shade. Volunteers from other state agencies, USFWS, Fort Bragg, and the North Carolina Native Plant Society helped to collect data and map stems within quadrants of the plots while the plants were in flower. Data collected included the number of stems, or clumps of stems coming from the ground, the number of live stems associated with each clump, the number of dead stems associated with each clump, whether or not the clump was in flower and its sex, an estimate of the flowering on the clump (few to many), or any insect damage or scale present on the stems. Each plot was marked with pins and flagging and

the GPS location was recorded. The shade condition and canopy species were recorded. Due to high densities of plants in some of these areas, this monitoring effort was very time intensive.

Heller's Blazing Star Monitoring

Liatris helleri (Heller's Blazing Star) is a federal and state endangered species targeted for protection at the Paddy Mountain Plant Conservation Preserve (established in 2002). However, there was a lack of clarity on the specific location of the plants and what their status was on the Preserve. Staff and volunteers conducted a survey and initial census during 2007. Four distinct areas supporting *Liatris helleri* were located at the top of Paddy Mountain. Two were quite small and isolated from the main rock outcrop populations and were quite easy to overlook (based on communication with previous observers it appears these small "clumps" or subpopulations were not previously noted). GPS points were taken at each location and the number of flowering stems was counted, and where possible, the number of rosettes as well. In one area, treacherous conditions precluded counting the number of rosettes, and in larger populations the number was too extensive to get a complete count. A comparison of GPS location data with property ownership layers prepared by NHP, suggests that the main population is found on protected ownership, and there is some possibility that the southernmost small population occurs on private lands. In comparing reports sent to the Natural Heritage Program in 2004, 1997, and 1994, the population seems to remain stable. The site appears to be in excellent condition with little to no evidence of trampling or disturbance. However, the proximity of the outcrops to adjacent private lands suggests the need to protect these properties if possible to provide additional buffer.

Smooth Coneflower Monitoring

Since 2005, PCP has been collecting annual census data on most extant populations of Smooth Coneflower (*Echinacea laevigata*) populations in North Carolina. In 2007, 12 of 17 populations and sub-populations were visited and all sampling methods from pervious years were followed. In addition, each individual rosette was marked with aluminum tags at the Infinity Road-Penny Tract (EO 31) and the Old Oxford Road-Williams Tract (sub-EO 23). Both sites are now protected on PCP Preserves, but are very small populations. The Infinity Road-Penny Tract population has not flowered since it was first discovered and there was only a single flowering stem at the Old Oxford Road-Williams Tract observed in 2007. The purpose of marking each rosette was to provide a means to better follow the fate of these plants and detect any change in the population size or flowering response that may result from management activities at these sites.

In the past three years, the status of Smooth Coneflower in North Carolina has changed considerably. Since 2004, PCP has been able to document three new subpopulations (all in Durham County), protect four existing subpopulations, and place six previously unmanaged subpopulations under active management, several of which have undergone second prescribed fires (Durham & Granville Counties). At least three of these managed

populations have shown positive flowering responses, and in at least one case, these were dramatic increases.

Plant Pathology Program

EXPORT: Assistance with Disease Certification Requirements and Distribution Information

Plants and plant products that are shipped from the U.S. into a foreign country must be accompanied by a phytosanitary certificate indicating that plant pest requirements have been met. Countries vary as to what they require, and careful evaluation is needed for each request. The Plant Pathologist received and handled requests from Field Specialists (as well as some North Carolina USDA-APHIS-PPQ personnel) for assistance with interpreting plant disease certification requirements, developing certification procedures, and providing disease organism distribution information.

EXPORT: Tobacco Blue Mold Oospore Field Survey (for Exporting Tobacco to China)

A blue mold oospore field survey must be completed annually in states where blue mold was reported in order to certify tobacco for export to China. This involves collecting leaf samples with blue mold symptoms and examining them in the lab for the presence of oospores. Oospores are one of two types of spores formed by the blue mold fungus. The other type is not of concern to China. Oospores are long-lived but not believed to develop in tobacco in the U.S. China requires an annual survey to verify this. It is important that all states participate in the survey because of the way tobacco is mingled, stored and collectively-sold. The Plant Pathologist was designated by USDA-APHIS-PPQ to plan, coordinate, and monitor the survey in North Carolina in 2007, as she had also done in 2001 through 2006. The North Carolina Cooperative Extension Service (NCCES) administrators were contacted and again agreed to authorize county extension personnel to collect samples from affected counties. The North Carolina State University Plant Disease and Insect Clinic was designated as the approved testing lab. The Flue-Cured Tobacco Cooperative Stabilization Corporation, the Burley Tobacco Growers Cooperative, and the Burley Stabilization Corporation paid for assays of samples collected in North Carolina and other states. Which group paid for what samples depended on the type of tobacco (burley or flue-cured) and the state of origin. For the survey itself, North Carolina used state-specific field survey procedures written by the Plant Pathologist based on those developed by PPQ. These were distributed to the NCCES offices via the NCSU Tobacco Pathology Specialists. In 2007, blue mold was reported in at least 10 counties in North Carolina. The surveys completed in 2007 (as well as those in 2001 through 2006) were negative for oospores in samples from North Carolina as well as from all other states.

In October, a delegation from China that included representatives from its national Inspection and Quarantine Bureau came to North Carolina to visit warehouses and other

tobacco-holding facilities to tour, observe, and collect samples on which to base purchasing decisions. As it has done for many years, the Division provided its greenhouse annex laboratory for their use in examining samples for blue mold oospores and other concerns. The Research Specialist spent over 100 hours in preparing and staffing the laboratory during their extended visit. They processed more than 40 samples, and no oospores were detected. Based on a personal communication with an industry representative, the Chinese subsequently bought 42 million pounds (farm-weight) of tobacco totaling approximately $88 million.

EXPORT: Nematode Certification Program

Before plants and certain other plant products can be certified for exported to Canada from North Carolina, they must be certified free of soybean cyst nematode. California has a similar requirement for reniform and burrowing nematodes. In 2007, 29 North Carolina nurseries were soil-surveyed in order to certify plants for shipment into Canada and/or California. Field Specialists collected soil samples and submitted them to the Nematode Advisory Service Lab (NCDA&CS' Agronomic Division) for assay according to procedures developed by the Plant Pathologist. The Plant Pathologist extensively revised the procedures and the lab submission form in 2007 since the lab started charging a fee for the assays as of July 1 (previously this was provided *gratis* to the exporters). A more precise sampling table based on numbers of plants or area sampled was developed so that costs for assays could be predetermined prior to collection and submission.

Reniform and burrowing nematodes were not found at any of the nurseries. Neither one of these nematodes has ever been found in a nursery in North Carolina. [Reniform nematode has been found in North Carolina under agronomic field conditions in eight counties, but burrowing nematode has never been detected in North Carolina at any location.]

In the past, when cyst nematodes were found in soil samples, soybean cyst nematode (SCN) certification was denied even though the cysts could actually have been an unregulated species. This was because non-regulated cyst species cannot be easily visually-differentiated from SCN, especially if the cysts are old. In 2007, the Division's Plant Pathology Lab (PPL) continued its second year of assaying cysts recovered from certification samples using a real-time PCR procedure adapted from research literature by the Laboratory Research Specialist. Using this procedure, SCN was confirmed at three nurseries (all from field soil in known-infested counties) and export certification for shipment to Canada was denied. However, cysts from one other nursery (in field soil in a county not known to be infested with SCN) were found NOT to be SCN, which allowed for certification of the nursery. Under a cooperative project with the Agronomic Division, the PPL is also using RT-PCR to test cysts found in service samples from counties where SCN has not been previously confirmed in order to expand the known-distribution map. One additional county (Lee County) was added this year under this project. This brings the total number of counties confirmed for SCN to 50.

IMPORT: Movement of Plant Pathogens for Research and Other Purposes

Federal PPQ Form 526 ("Application and Permit to Move Live Plant Pests or Noxious Weeds") allows the movement of plant pathogens and other pests into North Carolina from other states or countries for research, diagnostic identifications, or commercial uses. USDA-APHIS-PPQ receives the applications initially, evaluates them, adds conditions, and forwards draft permits to the Plant Pathologist for further evaluation and approval. Because all plant pathogenic organisms are regulated, the pest-risk of each organism must be evaluated to ensure that adequate safeguards are listed in the conditions of the permits. Thirty-eight (38) permit applications were evaluated by the Plant Pathologist in 2007, with most requiring further evaluation and comments before state approval could be given. Four permits were for receiving non-specified or unknown organisms for identification and other purposes. These latter types of permits, as well as those for higher-risk organisms, require lab inspections prior to issuance; these are conducted cooperatively by PPQ and NCDA&CS' personnel. Specifically-requested organisms included 101 fungi, five bacteria, seven viruses, and nine nematodes. All but one draft application were provided to the state for review via the new internet-based E-permit system, effectively signaling the end of paper permits. There is an ongoing cooperative effort between the Plant Pathologist and faculty at N. C. State University to maintain and update lists of "widely prevalent" plant viruses, fungi, and bacteria in joint projects with related American Phytopathological Society committees and USDA-APHIS-PPQ. Such lists are intended to help to expedite the processing of applications. These lists were reviewed and updated in 2007.

IMPORT: Imported Plants and the Post-Entry Quarantine (PEQ) Program

The federal Post-Entry Quarantine Program, conducted cooperatively between USDA-APHIS-PPQ and state plant pest regulatory officials, enables individuals or companies to import from outside the U.S. plant material that may pose a plant pest risk. Plants must be kept under quarantine for two growing seasons and be inspected for pests of quarantine significance (primarily diseases) before the importer is allowed to move, use, or sell them without restriction. The program also involves conducting pre-importation, site-screening inspections. PEQ activities are now handled and reported by the Plant Pathology Laboratory Research Specialist. There were approximately 6,853 plants (in 10 separate shipments) under post-entry quarantine at some time in 2007. The great majority (95% of the total number of plants) consisted of 3,348 maples in one shipment (which was released in 2007) and 3,194 maples in a second shipment (that is still presently under post-entry quarantine). Seven other shipments had < 140 plants per shipment, but required the same number of inspection visits. A total of 3,523 plants were released, leaving 3,330 plants still under post-entry quarantine.

NURSERY: Problem Plant-Samples and other Issues

The Division does not maintain a lab for general diagnostic purposes. Plant Protection Specialists collect problem-plant samples from nurseries during nursery inspections and

submit them to the NCSU Plant Disease and Insect Clinic (Raleigh) for diagnosis. These samples are assayed by the Clinic as a courtesy to the Division under a voucher system. The Plant Pathologist provides operational procedures for the submission of these samples and serves as the liaison between the Specialists and the Clinic, assisting with interpretation of diagnoses and recommendations when necessary. Thirty-seven (37) problem plant samples were submitted in 2007. Of these, the cause of symptoms for 15 samples was due to cultural problems or was undetermined. Some of the positive disease diagnoses included: root rot (*Phytophthora*) on arborvitae, boxwood, and Venus flytrap; black root rot (*Thielaviopsis*) on holly and verbena; needle blight (*Cercospora*) on juniper; anthracnose (*Colletotrichum*) on miscanthus and hosta; root and crown rot (*Fusarium*) on hosta; leafpot (*Cercospora*) on rhododendron, and hosta virus X on hosta.

Daylily rust continues to be detected on plants shipped from nurseries in other states to nursery dealers in North Carolina. Stop-sales were issued when symptoms were excessive (daylily rust is considered to be a quality pest). Copies of stop-sales were provided to the State plant pest regulatory officials in the offending nurseries' states for follow-up at their discretion.

NURSERY: Strawberry Plant Inspections

Strawberry plants are defined as nursery stock under the nursery certification regulation, but specific standards are not stated. However, due to the threat of anthracnose disease, special operational procedures are followed during the annual inspection (i.e., timing of inspections, more intensive inspection rates, and required removal of symptomatic plants). Although plants with anthracnose must be removed from the field prior to harvest so that remaining plants are "apparently free" of the disease, remaining plants may still be infected without showing symptoms. The N. C. Crop Improvement Association (NCCIA) administers a higher-level strawberry plant certification program which has a zero field tolerance for anthracnose. It also has requirements for plant source, sanitation, and field isolation, all of which minimize the chances for anthracnose development. NCCIA is responsible for conducting inspections of its own certified nurseries under a Memorandum of Understanding with NCDA&CS, although all nurseries must still be licensed by NCDA&CS. The Plant Pathologist coordinated inspection activities between the two agencies so that plants were inspected by one or the other, preventing overlap and duplication of effort.

QUARANTINE ISSUE: Chrysanthemum White Rust

In October, NCDA&CS received notice that chrysanthemum white rust, a disease of national quarantine-significance, had been detected on plants at a Maryland retail-chain store. The invoices indicated the plants were shipped by a large nursery in North Carolina. After further investigation, it was determined that the plants had actually been shipped from one of the nursery's contract-growers in another state. It was also determined that other retail-chain stores in Maryland and elsewhere had received plants from the same source. USDA-APHIS- PPQ requested for these locations be inspected.

Subsequently, chrysanthemum white rust was detected by PPQ personnel at one of those retail-chain stores in North Carolina. PPQ issued an Emergency Action Notification and arranged for destruction of the plants.

SUDDEN OAK DEATH: Nursery Inspection Program

Sudden Oak Death disease caused *Phythophthora ramorum* is killing thousands of oak trees in California and Oregon. To prevent artificial movement out the known-infested areas, nursery host plant shipments are regulated by federal (USDA-APHIS-PPQ) and state quarantines. The host list is extremely broad and continues to expand. However, the highest-risk types of plants appear to be species of Camellia, Kalmia, Pieris, Rhododendron, and Viburnum. General background and historical activities can be found on the Plant Protection Section website (http://www.ncagr.com/plantindustry/plant/disease/sod.htm). No regulatory actions (i.e. no "trace-forwards" nor "trace-backs") were required in 2007. However, a nursery survey was again conducted (fourth year). State field personnel received updated training, high-risk nurseries and dealers were identified by examining shipping records, and a laboratory was maintained and staffed (by the Plant Pathology Laboratory Research Specialist) to assay samples. A total of 102 nursery and nursery dealers were surveyed according to the federal protocol. NCDA&CS' Field Specialists collected 65 samples from plants with suspicious symptoms. These were assayed in the lab using ELISA to screen for *Phytophthora* species. As required by federal protocols, DNA was extracted from ELISA-positive samples and sent to the PPQ lab for PCR confirmation. No evidence of *Phytophthora ramorum* was found in any of the samples. The disease is not known to be established in any nursery or in any other location in North Carolina.

SUDDEN OAK DEATH: Cooperative Stream-baiting Project

The NCDA&CS participated in a cooperative project with the Department of Environment and Natural Resources, Division of Forest Resources for the early detection of *Phytophthora ramorum* (the cause of Sudden Oak Death) in streams using rhododendron leaves as bait. This was part of a multi-state project under the United States Forest Service (Forest Health Protection, Forest Health Monitoring Program). The pilot year for this project was 2007. Previous studies had shown that if *Phytophthora* species were significantly-present in natural areas, the streams that drained those areas could contain enough spores to be detectable by stream-baiting. In March, the Plant Pathology Laboratory Research Specialist traveled to Clemson University to a USFS-sponsored workshop to receive training in how to conduct the USFS-approved laboratory protocols and to identify *P. ramorum* in culture. For the survey itself, DFR and USFS personnel placed two mesh bags containing rhododendron leaves into ten streams at five different times throughout the season. Half of the recovered leaves from each sample were submitted to the NCDA&CS' Plant Pathology Lab (PPL) for culturing, and half were sent to a centralized national lab for PCR testing. All samples collected in North Carolina were negative for *P. ramorum*. Many of those submitted to the PPL were positive for other *Phythophora* species. Although not required by the stream-baiting

project, these *Phytophthora* isolates were provided to Dr. Kelly Ivors (NCSU) for DNA sequencing and species identification as part of a national *Phytopthora* survey in which she is participating. Final results were not available at the time of this report.

TOBACCO PLANT INSPECTIONS

The Tobacco Plant Certification regulation requires individuals moving tobacco plants into North Carolina from another state to do so under an import permit system. Every year, the previous five years' importers are sent reminder-letters. There were no import permit applications received in 2007. Although the import permit program was at one time extensive, most North Carolina tobacco growers today grow their own plants or obtain them from other growers locally. In either case, essentially all plants are now grown in float-culture greenhouses rather than in traditional plant beds

Another aspect of the regulation requires plants grown in North Carolina and sold for planting in a location more than 75 miles away from the place of production be inspected and certified. Plants certified under the regulation are inspected at least weekly during the shipping season. A major reason for this requirement is the possibility of moving blue-mold infected plants or virus diseases prematurely from one growing region into another, thereby initiating an early epidemic. There were two North Carolina-certified greenhouse tobacco plant growers this year (information on the total number of plants produced was not available). A new concern is that an increasing number of growers are beginning to grow burley tobacco in non-traditional regions (i.e., North Carolina piedmont, coastal plain, and sandhills areas). This is a concern because burley varieties are more susceptible than flue-cured varieties to blue mold. To date, it appears that burley tobacco transplants for planting this new acreage are produced locally and will not require certification.

VEGETABLE PLANT INSPECTIONS

The Vegetable Plant Certification regulation requires certification and weekly inspections of any vegetable plants grown in North Carolina for sale to commercial growers. There were no vegetable plant nurseries certified by the NCDA&CS this year. Instead, the joint N.C. Crop Improvement Association/NCSU Micro-Propagation Program has filled this role, primarily for sweetpotato cuttings/seed producers. The NCCIA/MPU inspection program meets or exceeds the requirements of the regulation and is the preferred alternative to NCDA&CS' inspections.

The regulation also requires that any plants or seed potatoes entering North Carolina be certified and meet certain disease standards. Field Specialists did not report any vegetable plant inspections at nursery dealer locations or any seed potato inspections at end-user locations. No complaints were received by end-users.

WEBSITE DEVELOPMENT

A restructured Departmental public website was launched on August 1, 2007. Prior to and following the launch, the Plant Pathologist, as well as all other staff members, worked with IT personnel to make revisions and corrections to their own web pages. The field operations website, where most of the plant pathology program's field operational procedures were stored and easily accessible to field personnel, became non-operational after August 1. In September, the Plant Pathologist, with input from other staff members, developed an outline for a new, expanded field operations website. The site was activated in December. Staff members were in the process of adding files to their sections as the year ended.

Regulatory Weed Program

Program Objective

The objective of the Regulatory Weed Program is to protect North Carolina agriculture, public health and native plant ecosystems from the harmful effects of noxious weeds. The regulation of noxious weeds is authorized by the North Carolina Plant Pest Law and the Aquatic Weed Control Act of 1991. Program activities include inspections, issuance of Phytosanitary Certificates, issuance of Scientific Permits for movement of regulated articles and the survey, control and eradication of listed noxious weeds. The program manager is also accountable for management of the Witchweed Eradication Project funded by USDA-APHIS.

2007 Program Accomplishment Highlights

- There were 62.4 acres released from witchweed (*Striga asiatica*) infested status leaving the total number of infested acres at 2,088.5. In the mid 1950's witchweed had infested nearly 360,000 acres in North Carolina alone. Counties that contain quarantined farms now include Bladen, Cumberland, Pender, Robeson and Sampson.

- New witchweed Quarantine boundaries to account for released areas were published in the Federal Register (Vol. 72, No. 35, Thursday, February 22, 2007, pages 7923- 7926).

- In a continuing effort to contain the infestation and evaluate results of witchweed eradication treatments, approximately 68,500 acres were surveyed for the presence of witchweed in 2007.

- The witchweed program is a model for other invasive weed eradication programs around the world. A program manual was provided to a weed scientist in Brazil to provide ideas for a witchweed eradication program being under evaluation in Brazil. Also, the Weed Specialist and several Witchweed Inspectors hosted two

scientists from Australia to discuss methodology and program strategies that would be helpful to them in eradicating *Orobanche* spp.

- Benghal dayflower (*Commelina benghalensis*), a federal noxious weed has been contained to small areas within two NCDA&CS' Research Stations. Infestations that were found were treated with soil fumigant to prevent re-infestation and spread by seed.

- Approximately 45,100 acres in cotton, soybean, corn, peanuts and tobacco were surveyed to determine presence of Benghal dayflower (*Commelina benghalensis*) in areas other than NCDA&CS' Research Stations and Farms to facilitate early detection and rapid response for eradication. No positive locations were found.

- Nearly 50 miles of the Cape Fear River system were surveyed jointly with other agency personnel to determine the presence of giant salvinia (*Salvinia molesta*) that may have spread from a small infestation in Pender County following 2006 flooding events. The Salvinia infestation in Pender County has been surveyed and controlled under the direction of Pender County Extension Agent Wayne Batten. The current infestation is now confined to about two acres.

- Small broomrape (*Orobanche minor*) was detected and hand pulled on the edge of a 17 acre hay field and at one spot along a roadside in Mitchell County.

- Purple loosestrife (*Lythrum salicaria*) was treated in several spots in Forsyth County and in the Bass Lake area of Watauga County. Several new spots were found and treated during survey in Forsyth County.

- Tropical soda apple (*Solanum viarum*) was found (approximately 100 plants) and hand pulled at Martins Meats and abattoir in Sampson County

- Oriental bittersweet (*Celastrus orbiculatus*) surveys showed that the plant was present in seven counties outside of the 18 Western North Carolina counties quarantined for this weed

- Approximately 2,250 acres were surveyed for Itchgrass (*Rottboellia cochinchinensis*) in Robeson County. Approximately 9.5 acres were treated by pulling, use of herbicides or soil fumigation to control the weed and prevent its spread.

- A proposal was submitted recommending amendment of the Noxious Weed Regulations to include the addition of beach vitex (*Vitex rotundifolia*) and bushkiller (*Cayratia japonica*).

- Fifteen Scientific Permits were approved to authorize movement of regulated articles out of quarantine areas for educational or scientific purposes.

- Sixty-seven phytosanitary permits were written to permit movement of regulated articles, mostly straw and hay, out of regulated areas.

- Consultations were initiated with shippers and receivers of forage to help prevent the movement of noxious weeds in shipments into North Carolina and from regulated areas in North Carolina during the shortage caused by the exceptional drought experienced in North Carolina during 2007.

- Public presentations describing North Carolina's Regulatory Weed Program were made at an NCSU Workshop on Invasive Weeds Management, at the annual meeting of the North Carolina Exotic Plant Pest Council and at a Weed Science seminar for Crop Science faculty and students at North Carolina State University.

- Weed identification and consultation related to weed control in lawns, pastures and non-crop sites were provided to the general public on three occasions monthly.

- The Weed Specialist serves as a board member on the North Carolina Exotic Plant Pest Council and the Aquatic Weed Control Council.

- A review of an Invasive Species Management Plan for the North Carolina Arboretum was completed at the request of a consultant working on the project for the Arboretum.

Weed Survey and Eradication Program Details

Survey Methodology and Rationale

Surveys for all projects were completed by visual reconnaissance. Objectives were to identify new infestations of the weed pests (i.e. detection surveys) and to delimit the boundaries where the weeds were mapped in previous years (i.e. delimiting surveys). Detection survey location targets were selected based on probability that subject plant pest would be present. In some instances, GPS coordinates were recorded to provide reference points for mapping and relocation, if needed. Roadsides close to wet areas and home landscapes were targets for Purple loosestrife detection surveys. A sampling of roadsides bordering counties quarantined for Oriental bittersweet was surveyed for presence of Oriental bittersweet. Locations known to have been infested with *Orobanche minor* in the past were checked at least three times in spring or early summer for reoccurrence of the weed. A known infestation in a hay field was monitored to delimit the size of *Orobanche minor* infestation and prevent additional spread by hand pulling plants at time of survey. The infestations of Tropical Spiderwort at the Cherry Research Farm (2,245 acres) and Tidewater Research Station (1,516 acres) were delimited by continuous surveys across all land in both places every three to four weeks through the growing season. In addition, detection surveys were completed on a random sample of

operating farms in the 10 highest agriculture production counties in North Carolina as well as at selected NCDA&CS' Research Farms.

Since plant species must be identified during the growing season, all surveys were conducted during the period from full leaf (May) through the first hard freeze (usually mid November). No taxonomic services were budgeted or used in the projects.

Orobanche minor

Originally, *Orobanche minor* infested two fields and nine road shoulder sites in Mitchell County, North Carolina. In 2007, no new infestations of Orobanche were detected and all existing infestations were found only in Mitchell County, North Carolina. Several *Orobanche minor* plants were detected on a road shoulder on Highway 226 in Mitchell County near Ledger, North Carolina. These plants were hand pulled prior to flowering. A hay field in Mitchell County off of White Oak Road near Bakersfield, North Carolina had an infestation along two edges of the 17 acre field. The field edges (total infestation estimated to be less than two acres) were hand pulled several times by permanent NCDA&CS' staff in April and May. See Figure 1.

Steven Troxler, Commissioner

2007 WEED SURVEY in western North Carolina

Small Broomrape

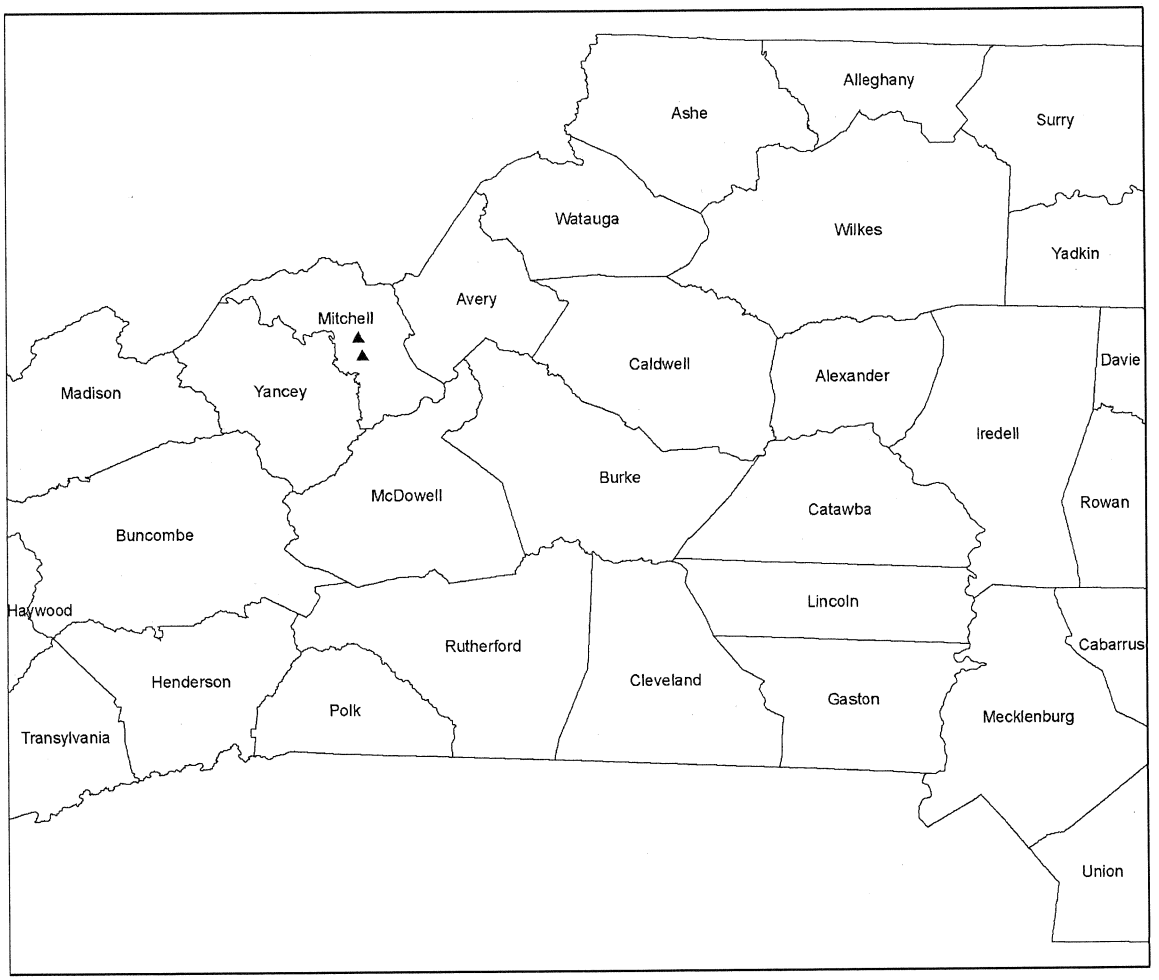


Figure 1. Locations in Mitchell County where *Orobanche minor* was found in 2007.

Purple Loosestrife (PLS) (*Lythrum salicaria*)

Survey Locations: Past infestations in Alleghany, Ashe, Avery, Carteret, Cherokee, Clay, Columbus, Edgecombe, Davidson, Forsyth, Graham, Green, Halifax, Haywood, Henderson, Jackson, Jones, Lenoir, Macon, Mitchell, Onslow, Pamlico, Polk, Richmond, Scotland, Swain, Transylvania, Watauga, Wayne, and Wilson Counties were all surveyed at least once during 2007. Points in Western North Carolina where PLS was found are shown in Figure 2.

Results: One plant in a landscape bed at Roaring Gap Golf Course was detected and treated with the permission of the Golf Course Management. A re-occurring infestation near Spruce Pine, North Carolina (Mitchell County) was infested again in 2007 with six plants that were treated with herbicide in July and one plant that was treated with herbicide on Sept. 5. Watauga County also had three infestations of PLS in 2007. However, at one time PLS was found at 16 sites. Two of these sites continue to be infested every year. The largest infestation in the Blue Ridge Mountains (50 + plants) is located at Bass Lake in the Moses Cone's Estate near Blowing Rock, North Carolina. The infestations in Forsyth and Davidson Counties are located along a sewer and utility line rights-of-way spanning approximately six miles within the watershed of Fiddler and South Fork Creeks. These sites are monitored and treated annually. Three treatments of Garlon 3A (2% solution V/V) were made to PLS plants at 16 sites totaling approximately 16.9 acres in Forsyth and Davidson Counties. Due to the drought in 2007, it was possible to do detection surveys previously difficult to get to because of site conditions. The detection surveys resulted in two new sites: 1) Near the intersection of Teague Rd and Highway 109 along the sewer line; and, 2) Along the bank of South Fork Creek that runs through the Willshire Golf Corse on Silas Creek Parkway.

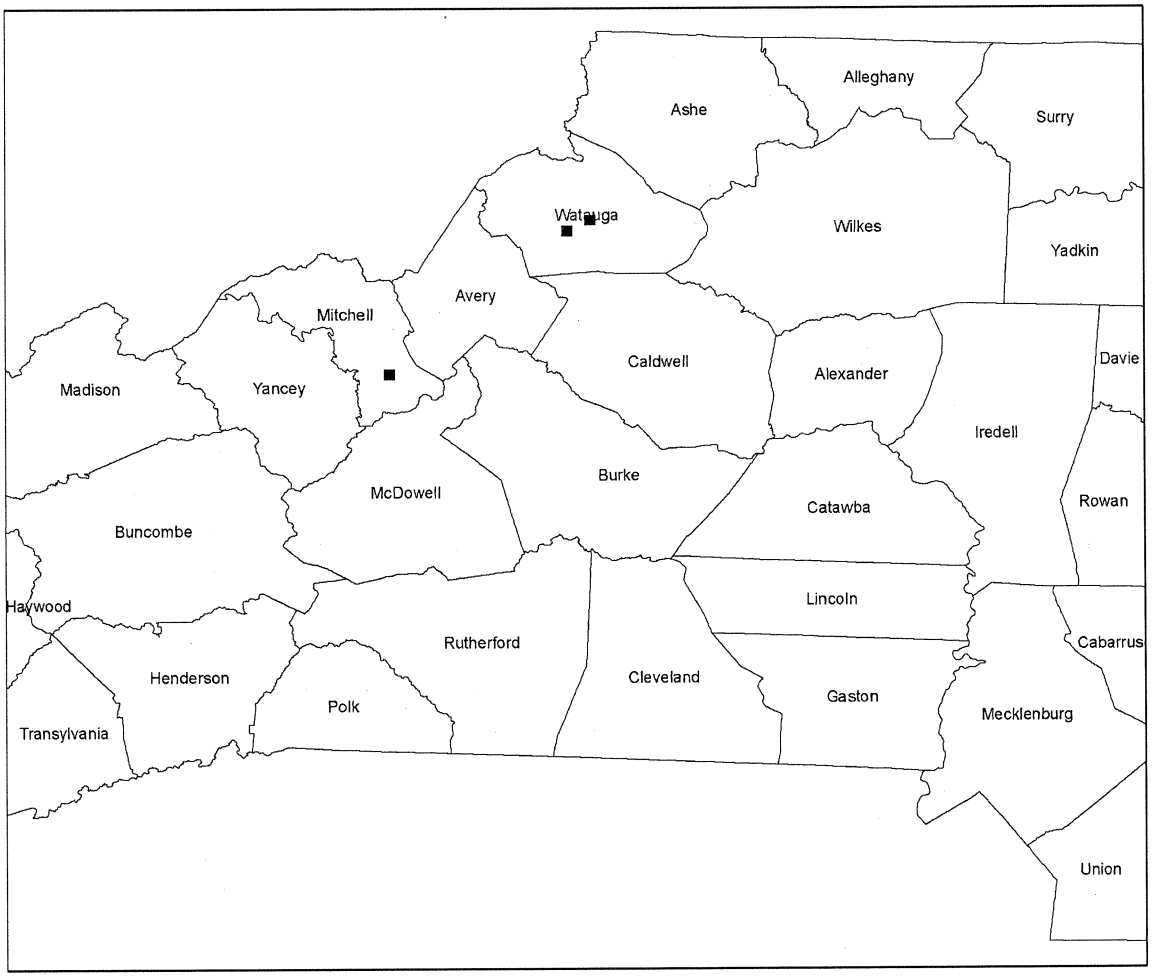
Oriental bittersweet (*Celastrus orbiculatus*)

Survey Locations: Alleghany, Ashe, Avery, Burke, Caldwell, Henderson, Madison, McDowell, Mitchell, Orange, Polk, Rutherford, Stanly and Wilkes Counties. Figure 3 shows new locations where Oriental bittersweet was detected in 2007 in Western North Carolina Counties. Detections in Rutherford, McDowell, Polk, Burke, Stanly and Caldwell Counties are significant since these counties are outside of the quarantine area for Oriental bittersweet now making the total number of quarantined counties 25, which are five more than the guideline for a Class B Noxious Weed Listing. The location in Stanly County is at Morrow State Park and is being managed by the U.S. Forest Service and the location in Orange County is at the North Carolina Arboretum in Chapel Hill, North Carolina.

Steven Troxler, Commissioner

2007 WEED SURVEY in western North Carolina

Purple Loosestrife



Legend

- 2007 Purple Loosestrife Detection

N

0 5 10 20 30 40 Miles

Every effort has been made to ensure the accuracy of information, but errors and conditions originating from physical sources used to develop the database may be reflected in the data supplied. The requester must be aware of data conditions and ultimately bear responsibility for the appropriate use of the information with respect to possible errors, original map scale, collection methodology, currency of data, and other conditions specific to certain data. This map was prepared by Ken Ahlstrom on November 30, 2007. NCDA & Consumer Services – Plant Industry Division.

Figure 2. Locations where purple loosestrife was found in Western NC counties.

Steven Troxler, Commissioner

2007 WEED SURVEY in western North Carolina

Oriental Bittersweet

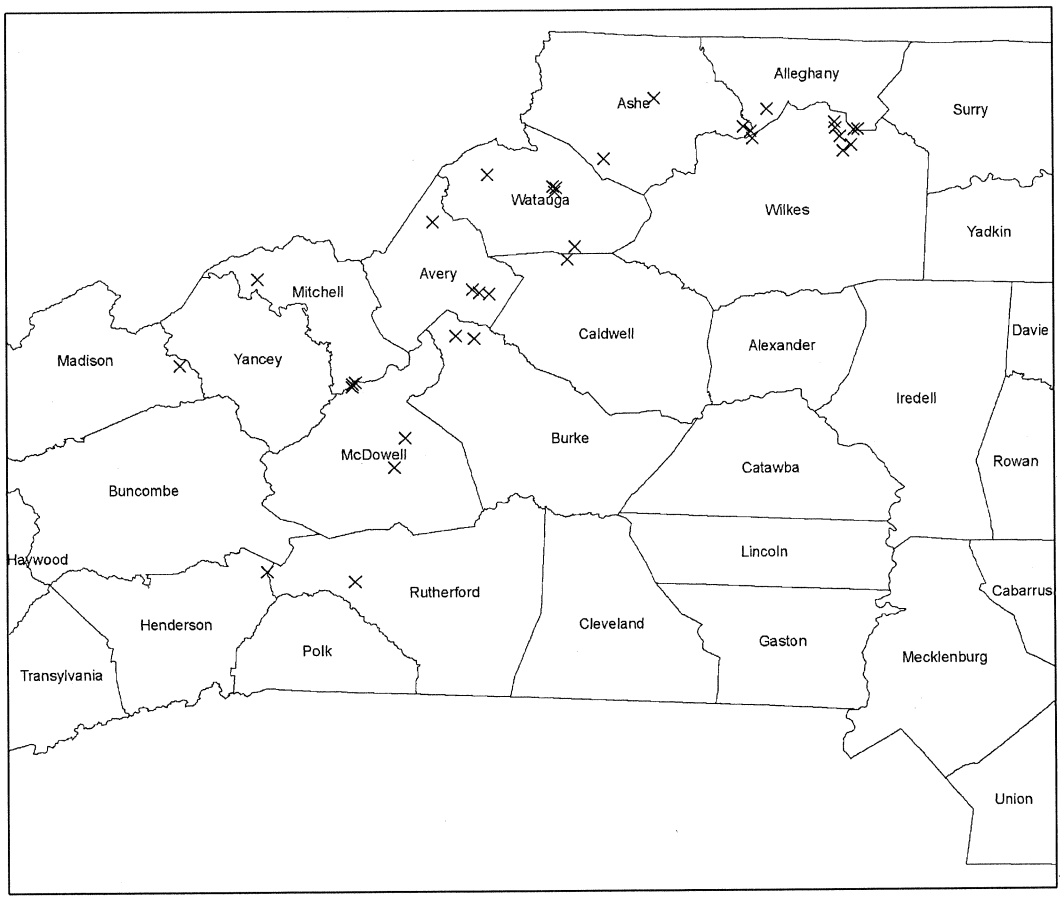


Figure 3. GPS Locations where Oriental bittersweet had not been found in previous surveys in Western North Carolina counties. Locations not referenced by GPS were also found in Polk and Stanly Counties.

Meadow fleabane (*Unula britannica*)

Survey Locations: Watauga County in response to potential detection in a County Fair exhibit.

Results: The plant in question was confirmed to be autumn sneezeweed (*Helenium autumnale*) and not *Inula britannica.*

Tropical Soda Apple (*Solanum viarum*)

Survey Locations: Livestock abattoirs and pasture holding areas in Ashe, Watauga and Sampson Counties.

Results: Martins Meats and Abattoir and Coharie Farms, totaling 1,110 acres, were surveyed on July 24-25 and again on September 25-26, 2007. Fifty-eight plants without fruit were found, hand pulled and destroyed on the July 24-25 survey. Approximately, 109 plants (some with fruits) were found, hand pulled and destroyed on the Sept. 25-26 survey.

Itchgrass (*Rottboellia cochinchinensis*)

Survey Locations: Robeson County on a single farm.

Results: A total of 2,250 acres was surveyed. Itchgrass was detected on a small portion of the acreage surveyed and treated as follows:

- Roundup application to 5.2 acres
- Hand pulling on 4.2 acres (875 plants were pulled and fumigated in plastic bags)
- Fumigation with methyl bromide on 8 spots totaling 1,500 sq. ft.

Benghal dayflower a.k.a. Tropical Spiderwort (*Commelina benghalensis*)

Survey Locations: The Upper Mountain Research Station at Laurel Springs, North Carolina in Ashe County was surveyed twice. Surveys were conducted periodically (at least every twenty-one days) at the Cherry Research Farm and the Tidewater Research Stations. Intensive survey by NCSU has continued in the Farming Systems Research Unit (roughly 200 acres and 47 fields) in the CEFS area at the Cherry Research Station. A survey schedule has been followed that includes survey of high priority fields (highest level of past infestation) four times per month, survey of mid-priority fields (fields with moderate infestation or fields next to high infestation fields) three times per month and survey of low-priority fields (fields with no known infestation in the past) two times a month.

In addition, a random sample of operating farms were surveyed at least once in the following counties: Edgecombe, Johnston, Beaufort, Tyrell, Wake, Lenoir, Moore, Scotland, Halifax, Nash, North Hampton, Sampson, Duplin, Pender, Bertie, Granville,

Vance, Franklin, Harnett, Wayne, Randolph, Yadkin, Davidson, Surry, Columbus, Martin, Pasquotank, Perquimans and Currituck. No Benghal dayflower was found at any of these locations. Additionally, no Benghal dayflower was found in a survey at the Upper Mountain Research Station.

Benghal dayflower was found in new or re-infested fields at the NCDA&CS' Cherry Research Station totaling approximately 14.5 acres in the following fields: 1) field C-10 where three plants were found near a spot that was treated in 2005; 2) in the old dairy research area where 100 plants were found in an area no more than 0.25 acres; 3) field A30A where 200+ plants were found within 12 feet of the field's edge; and, 4) field C-4 where plants were found in the ditch area next to the seed research plot. The infested portions and a buffer in field C-10 (two acres), field A30A (10 acres) and field C4 (2.5 acres) were fumigated with methyl bromide.

Benghal dayflower was found in an irrigation wheel trench along field E-5 at the NCDA&CS' Tidewater Research Station. This field was infested previously. An area 0.9 acres in size along the edge of the field and centered on the irrigation wheel trench was fumigated on November 8th.

Approximately 45,127 acres planted with cotton, soybean corn, peanut, tobacco or other minor crops were surveyed on random operating farms in addition to surveys in livestock holding areas in Sampson County. No Benghal dayflower was detected in these surveys.

Intensive survey by NCSU has continued in the Farming Systems Research Unit (roughly 200 acres and 47 fields) in the CEFS area at the Cherry Research Station. A survey schedule has been followed that includes survey of high priority fields (highest level of past infestation) four times per month, survey of mid-priority fields (fields with moderate infestation or fields next to high infestation fields) three times per month and survey of low-priority fields (fields with no known infestation in the past) two times a month.

In the Farming Systems Research Unit (FSRU) of the Cherry Research Farm, TSW was first detected in the 2007 growing season on June 15 in field 27. In general, germination was significantly lower in 2007 presumably due to the drought. No new fields were shown to be infested in the FSRU during 2007. Any plants that were found were immediately pulled, bagged and fumigated with the intent of catching newly emerged seedlings prior to flowering to prevent the spread of seed and buildup in the soil.

Giant salvinia (*Salvinia molesta*)

Survey Locations: The River Bend Subdivision near Burgaw, North Carolina in Pender County and 50 miles of the Cape Fear River System downriver from the River Bend Subdivision infestation.

Results: The only documented remaining infestation of *Salvinia arolinamolesta* is located in the River Bend Subdivision in Pender County near Burgaw, North Carolina.

On June 12th, over 50 miles of the Cape Fear River drainage system was surveyed by boat to verify the containment of the infestation in the swamp areas surrounding the River Bend Subdivision Community. After flooding of the site in 2006, it seemed probable any existing plants could have escaped from the River Bend area in flood waters. No giant salvinia was detected in the survey of the Cape Fear River drainage system.

The Giant Salvinia Task Force remains active in the River Bend area under the direction of Wayne Batten, Pender County Extension Agent. Survey continues in the River Bend area by temporary task force employees and plants are treated as encountered. It is estimated giant salvinia is contained to about two acres in the swamp area surrounding River Bend and plans are in place to aggressively treat the remaining infestation in early 2008 with penoxsulam and fluridone under the direction of SePro Company Technical personnel. Although the Salvinia weevil was effective in reducing contiguous mats of Salvinia, it was believed that the weevil would not be effective in eradicating the remaining infestation. Therefore, formal population monitoring and additional releases of the Salvinia weevil were not done.

Witchweed (Striga asiatica) Eradication Program

Witchweed Eradication Program Objectives, Methods and Rationale

Witchweed (*Striga asiatica*) is a Federal Noxious Weed and a Class A State Noxious Weed in North Carolina. It is an obligate parasite which attacks corn, sorghum, millet, and other warm season crops in the grass family. Heavy infestations of Witchweed can eliminate yield from these crops, resulting in devastating economic losses. The presence of this quarantined pest also imposes a regulatory burden on crop production and on the movement of farm commodities, equipment, and other regulated articles. The Witchweed eradication program includes an organized and effective set of survey, control and regulatory procedures developed through early USDA-APHIS research. Specific objectives of the program include: 1) characterization of the infestation through survey; 2) control of existing infestations; and, 3) containment by preventing the movement of potentially infested articles out of established quarantine boundaries.

1. **Survey** – Survey is necessary to detect and verify the extent of Witchweed (Detection and Delimiting surveys), evaluate the effectiveness of eradication treatments on infested properties (Appraisal surveys), and verify eradication of Witchweed on sites released from quarantine (Released surveys). Additional survey of terminated acreage is required in order to confirm the long-term effectiveness of the eradication program. Survey is done throughout the growing season after host plants have started to grow from about the middle of June through the end of October or until the first frost.

2. **Control** – The objective of control treatments is to prevent Witchweed seed production and eliminate Witchweed seed from the soil. Herbicide treatments, hand pulling and disking help to control witchweed host plants and witchweed

plants before they can flower and produce seed. Methyl bromide fumigation of additional infested acreage will destroy reserves of witchweed seed in the soil and accelerate completion of the eradication program. Ethylene applications also help to deplete soil reserves of witchweed seed by encouraging germination and subsequent control by exposure to treatments or a non-host crop. Control treatments can be completed during the growing season and into the winter months provided soil moisture and temperature are favorable for soil fumigation.

3. **Regulatory** – Regulatory activities aid in preventing the artificial spread of Witchweed from infested areas to non-infested sites. These regulatory functions facilitate the interstate and intrastate movement of agricultural commodities from Witchweed regulated areas.

Witchweed Eradication Program Acreage Status by State

All control treatments and surveys are tracked in a database that updates the status of infested fields and released fields. New or re-infested fields are added to the infested field list when Witchweed is confirmed in new fields or fields that have been previously released. A point system was developed for the program that provides a quantitative measure for moving fields from infested to a released status and from a released status to a terminated status. Infested fields are assigned points depending on the nature of the field and the control activities that were done on it during the season. Once a field accrues five points it is advanced to "Release" status, which means it is surveyed on a schedule for a minimum of 10 years and assigned either 0.5 points for a spot survey or 1.0 points for a general survey. Once a field acquires 10 points it is terminated from the program.

The following summary tables show the estimated status of acreage in North Carolina and South Carolina as of September 30, 2007. Since there is still some survey and control activity after September 30, the acreage estimates for the growing season may vary slightly because there may be some new infestations discovered that could add infested acreage from previously terminated or new fields or previously released fields. Also, there may be some additional control treatments that could move some fields from an infested status (field with less than five points) to "released" status (fields with more than five points).

2007 North Carolina Acreage Status

Total Acres Infested	2,088.50
Total Acres Released	431.60
New or Re-infested Acres	369.20
Net Gain in Eradicated Acres	62.40

Total Acres Treated	4,527.37
Acres Surveyed	68,581.10

Infested Acres in North Carolina Quarantined Counties by Point Value

County	0-0.9	1-1.9	2-2.9	3-3.9	4-4.9	Total
Bladen	4.50	96.80	32.00	280.50	42.90	456.70
Cumberland	232.80	63.90	8.40	61.80	684.50	826.40
Pender	0	11.10	0	0	0	11.10
Robeson	0	0	1.50	308.50	196.50	506.50
Sampson	11.70	13.50	1.50	3.70	32.40	60.40
Total	249.00	185.30	43.40	654.50	956.30	1,861.10

Other Statistics for North Carolina

Acres treated by Contract	215
Counties now infested in North Carolina	5
Number of Witchweed Bounty payments	67
Associated Witchweed Bounty acreage	854
Number of Phytosanitary Certificates Issued	67

2007 South Carolina Acreage Status

Total Acres Infested	154.30
Total Acres Released	242.40
New or Re-infested Acres	0.00
Net Gain in Eradicated Acres	242.40
Total Acres Treated	796.17
Acres Surveyed	8,620.40

Infested Acres in South Carolina Quarantined Counties by Point Value

County	0-0.9	1-1.9	2-2.9	3-3.9	4-4.9	Total
Marion	0	0	0	23.90	60.80	84.70
Horry	0	0	2.40	39.70	27.50	69.60
Total	0	0	0	63.60	88.30	154.30

Other Statistics for South Carolina

Acres treated by Contract	0 acres
Counties now infested with Witchweed	2
Number of Witchweed Bounty payments	16
Associated Witchweed Bounty acreage	240 acres

2007 Summary of Survey Acreage

State	Survey Category	Total Acres
North Carolina	Appraisal	8,955.60
	Release	29,436.10
	Delimiting	6,153.10
	Detection	24,036.30
Total Survey Acreage NC		**68,581.10**
South Carolina	Appraisal	1,634.80
	Release	1,832.20
	Delimiting	4,912.40
	Detection	241.00
Total Survey Acreage SC		**8,620.40**
Grand Total Survey Acreage		**77,201.50**

2007 Treatment Summary by Crop and Treatment Type

Treatment Acreage by State and Crop

State	Crop Name	Number of Treated Acres	Number of Fields
North Carolina	CORN	1282	145
	GARDEN	64	25
	IDLE(NONCROP)	2111	311
	OTHER	128	78
	PEANUTS	28	8
	SOYBEANS	867	74
	WILDLIFE PLANTING	44	21
	YARD	5	15
Total		**4527**	**678**
South Carolina	CORN	15	6

	COTTON	65	3
	GARDEN	7	3
	IDLE(NONCROP)	399	78
	OTHER	42	17
	PASTURE/COASTAL BERMUDA	12	1
	SOYBEANS	229	20
	YARD	18	8
Total		**787**	**136**
Grand Total		**5314**	**814**

Treatment Acreage by Treatment Type

	TREATMENT DESCRIPTION	TREATED ACRES	NUMBER OF FIELDS
01	2, 4-D 0.5 PD, OT	2	3
03	2, 4-D 1.0 PD, OT	22	12
04	2, 4-D 1.0 + LIQUID NITROGEN	39	4
06	2, 4-D + GRAMOXONE 1.0 + .125-.25PDOT	160	19
08	GRAMOXONE 0.25 PD, OT	13	1
09	GRAMOXONE 0.50 PD, OT	120	17
12	GOAL 0.50+ LIQUID NITROGEN	41	5
15	GOAL 1.0 PD, OT	3	1
17	GOAL + GRAMOXONE 0.50 + 0.125 PD, OT	5	1
24	GOAL + 2, 4-D 0.75 + 1.0 PD, OT	4	2
26	2, 4-DB 0.25 OT	1	1
27	ATRAZINE 1.0-1.5 PPI, PES	95	7
32	BASAMID "G" 295 SA	9	41
33	BLAZER 0.5 PD, OT	1	1
36	CURBIT 1.1-1.7 PES	16	2
39	DISKING- 100% GRASS KILL	1550	180
40	DUAL 1.125-3.0 PES	65	16
41	ETHYLENE (HAND) 1.5 INJ	5	18
42	ETHYLENE (TURF) 1.5-3.0 INJ	5	3
43	ETHYLENE (TRACTOR) 1.5 INJ	1202	150
49	METHYL BROMIDE (CONTRACT) 436.0	18	4
50	METHYL BROMIDE (SPOT) 436.0	.04	2
51	OUST 0.05-0.2 PD, OT	.10	1
52	PAARLAN 0.75-1.5 PPI	19	1
53	POAST 0.2-0.5 OT, PD	11	1
60	REFLEX + FUSILADE .375 +.06-.19PD, OT	10	2
61	ROGUE- 100% WITCHWEED REMOVAL	86	110
62	ROUNDUP 0.50-2.0 OT	1530	157
71	TREFLAN "G" 3.0-4.0 SA	5	16

72	TREFLAN-EC 0.5-1.0 PPI	281	31
85	CLARITY 0.25-0.5 OT, PD	5	2
89	ROUNDUP + 2, 4-D .5-2.0 + 1.0 OT, PD	1	6

Witchweed Eradication Project Field Offices

To facilitate witchweed project field activities, the following staff resources are currently in place to assist with the witchweed project in North Carolina:

Rick Iverson, Weed Specialist, State funding
Sheyrl Colclough, Processing Assistant III, Federally funded (50% WW, 50% GM)

Fayetteville Work Unit: Kirby Brock, Plant Pest Inspector, Federally funded

Lumberton Work Unit: Sonny Sampson, Plant Pest Inspector, Federally funded

Elizabethtown Work Unit: Rondy Godwin, Plant Pest Inspector, Federally funded

Clinton Work Unit: Earl Brewington, Plant Pest Inspector, Federally funded

Witchweed Plant Pest Aides (Personnel assist Plant Pest Inspectors in conducting all field activities in each of the work units)
Richard Smith, Plant Pest Aide, Federally funded
Robert Earl Cooper, Plant Pest Aide, Federally funded
Cleveland Chavis, Plant Pest Aide, Federally funded

Witchweed Project Support:
E.J. Phillips, Mechanic II, Federally funded
Dustin Mercer Mechanic I, Federally funded

Support Operations

The NCDA&CS' Plant Industry Division, Support Operations Facility is located on the Dorothea Dix Campus. There are three full time and two temporary employees at this site. Additionally, there are two full time employees stationed at the Witchweed Methods Shop, Whiteville. The Support Operations Unit is responsible for supplying and maintaining vehicles, equipment, and trucks for Plant Industry Division programs. Additionally, Support Operations personnel are frequently required to assist in the implementation of field activities as requested. The Support Operations Unit provides maintenance and repairs on over 120 vehicles, 25 Gator, Mule, Polaris, Kawasaki, Suzuki and Arctic Cat ATV's, 48 trailers and tractors. The Support Operations Unit also provides ongoing maintenance for the Support Operations Facility, NCDA&CS' Beneficial Insect Lab, NCDA&CS' Plant Industry, Crossnore Station, Witchweed Methods Shop, NCDA&CS' Blueridge Road Greenhouse and the Old Health Building.

Support Operations activities for 2007 included the following:

Gypsy Moth Program
Support Operations personnel assisted with aerial spray treatments and ground applications across the state. Staff members assisted with survey and detection activities throughout the state. Staff also provided trucks, equipment and supplies for temporary personnel. Support Operations has taken responsibility for Gypsy Moth Trap assembly through the N.C. Department of Correction.

Boll Weevil Eradication Program
All traps and supplies were warehoused at the Support Operations Unit and distributed to program contractors. Support Operations' staff provided vehicles, supplies and equipment to quality control personnel.

Sweet Potato Weevil Program
Staff provided direct support for full time and temporary personnel responsible for placing over 5,000 traps. Staff provided vehicles, supplies and equipment for temporary personnel.

Plant Conservation Program
Numerous activities were conducted in support of the Plant Conservation Program. Support Operations' staff members assisted with site preparation for prescribed burns, habitat restoration, surveys and debris removal. Members of Support Operations and Plant Conservation staffs have been working actively to find equipment to be utilized in the Plant Conservation Program.

Division Safety
Based on new departmental policies, members of the Support Operations' staff evaluated numerous options and helped steer the Division Safety Committee on the most beneficial format to present effective safety training to meet the needs and goals of the Department. New methods of Aerial and Ground Application Safety Practices are continually evaluated and implemented as needed. New policies and training activities were established and implemented for use in 2008 for ATV use. Safety training and support for all seasonal programs were conducted by Support Operations Staff.

Emergency Programs
Support Operations' staff actively assisted NCDA&CS' Emergency Programs, NCDCC&PS Office of Emergency Management and USDA-APHIS Emergency Programs with both storage and planning/implementation of numerous initiatives related to disaster recovery activities, as well as storage and maintenance of critical emergency response equipment. Numerous activities were conducted in 2007 which included staff members from Support Operations. These included after hours access and deployments as well as long term Incident Command assignments.

Support Operations' staff also assisted with or supported other programs. These included surveys and/or treatments for Giant Salvinia, Imported Fire Ant, Itchgrass, Purple Loosestrife, Tropical Soda Apple and Tropical Spiderwort, as well as other pests and numerous plant diseases.

Members of the staff are actively involved in renovations to the Old Health Building, which should finish Phase I in early spring 2008. Phase II renovation is currently in the planning stage.

Several programs require specialized equipment prepared by Support Operations' staff. The staff members at Support Operations and the Whiteville Shop are frequently called on to make modifications and/or design and fabricate equipment. Both the Raleigh shop and Whiteville shop are equipped to fabricate and modify equipment to meet program and Departmental goals and objectives.

Seed Program

The NCDA&CS' Plant Industry Division Seed Program continues to serve three main functions, all related to the sale of quality seed in North Carolina. (1) Seed regulatory inspection program, (2) NCDA&CS' Seed Testing Laboratory (this laboratory conducts tests for quality factors including purity, germination, TZ and other related tests), (3) NCDA&CS' Plant Pathology Laboratory (this laboratory conducts regulatory and plant disease testing for the Plant Industry Division staff along with other seed health services). Seed program staff also implements, in cooperation with USDA, a biotechnology permitting program.

The N.C. Seed Board and alternates, appointed by the Commissioner, have the responsibility to arbitrate issues when farmers and other seed consumers allege that seed have not performed as labeled or warranted. Members of the board, appointed by the Commissioner of Agriculture, are as follows: Gene B. Cross, NCDA&CS, Chairman; Eddie Martin, NCDA&CS (Alternate); Larry Wooten, farmer; Peter Daniel, farmer (Alternate); Kyle Edwards, North Carolina Seedsmen's Association; Jim Martin, North Carolina Seedsmen's Association (Alternate); Dr. Janet F. Spears, North Carolina Cooperative Extension Service (NCCES); Dr. Daryl Bowman, NCCES (Alternate); Dr. Ramsey Lewis, North Carolina Agricultural Research Service (NCARS), and Dr. Andrea Cardinal, NCARS (Alternate). For 2007, there were ten seed complaints initiated by producers; however, each of these was resolved prior to arbitration in 2007.

Seed Inspection

NCDA&CS' Seed and Fertilizer Inspectors conducted inspections of agricultural, lawn turf and vegetable seeds at retail and wholesale seed dealers. For 2007, there were 4,404 Seed Dealer Licenses issued. As part of inspections at these locations, seed were checked for compliance with labeling requirements and quality standards as outlined in the North Carolina Seed Law and pursuant regulations. Seed and Fertilizer Inspectors made dealer visits and collected 3,590 official seed samples from the 42,668 seed lots inspected. A total of 1,751 stop sale notices were issued during the year. Of these, 97 were issued for non-compliance with the North Carolina seed standards, with 1,654 stop sales resolved on site. An additional 185 stop sales were issued through the NCDA&CS' Seed Testing Laboratory after quality tests were run.

The North Carolina State University (NCSU), Tobacco Variety Evaluation Program, was continued and staff collected samples from 38 lots of flue-cured tobacco seed for planting the grow-outs in the variety program. All seed lots that were tested were found truthfully labeled as to variety and recommended to be offered for sale by the Tobacco Seed Committee. The NCDA&CS' Tobacco Seed Committee includes Dr. David Monks NCSU, Chairman, Dr. David Smith NCSU, Dr. Loren Fisher NCSU, Mr. R.J. Raynor, Seedsman, Mr. Milton Beaman, Producer, and Mr. David Davenport, Farmer.

Seed and Fertilizer inspectors sampled 424 seed lots utilized on North Carolina Department of Transportation's (NCDOT's) highway projects. The sampling and testing of these seed lots are vital to NCDOT's seed quality assurance program. Some lots submitted for testing for DOT were stopped in the laboratory for violations of the North Carolina Seed Law and pursuant regulations. Those lots not in compliance with the NCDA&CS and NCDOT's minimum standards were rejected for use by NCDOT as well.

NCDA&CS' Seed Testing Laboratory

The NCDA&CS' Seed Testing Laboratory has dual roles including seed testing support for the Plant Industry Division's regulatory program and service testing of seed for North Carolina seed dealers, seed producers, farmers, university researchers and other seed consumers. Seed producers and dealers use seed testing data to make management decisions about seed stocks and for labeling purposes. For 2007, the laboratory conducted 7,755 service seed tests and 5,010 regulatory seed tests. These seed tests were conducted on the 6,123 service samples received and the 3,590 samples collected by the Seed and Fertilizer Specialists. The total sample count for 2007 was 9,713. Routine tests provide purity (including noxious weed seed examination) and germination information. Specialized tests include seed lot vigor and variety purity information. Other special tests include: tetrazolium, accelerated aging, cool test of cotton, cold test of hybrid corn, phenol, Roundup Ready tolerance, sand, and moisture testing. The laboratory has also provided special testing for phytosanitary certificates required for the exportation of seed lots.

The Seed Laboratory is an active member of the Association of Official Seed Analysts Rule changes and new research is presented and discussed. Rules are voted on and become part of accepted procedure.

In 2007, the Laboratory Research Specialist continued to cooperate in aiding the Seed Section with data testing and troubleshooting their new database system. This system is being rewritten to accommodate advances in technology and the growing needs of the laboratory. In order to serve all sample submitters, the system has required the additional or more functionality, growing the database into a large entity. With the resignation of the major programmer in July, the Plant Pathology Laboratory has been able to offer major support and interim programming until a replacement is found. This cooperation has resulted in the creation, deployment and troubleshooting of a printing program, a manager's program and a program for the reporting and tracking of the tetrazolium testing. These programs offer the laboratory the ability to search and filter data and to create the preview reports before they are printed. The manager's front end allows the Seed Laboratory Supervisor to quickly and accurately obtain data on individual samples in response to public request.

N.C. Plant Pathology Laboratory

The Tall Endophyte Testing Program continues to accept samples from both instate and out-of-state sources. Many other testing labs, including some of those connected with universities, have discontinued their testing services. The NCDA&CS' Tall Fescue Testing Service is now one of few that still accept samples. The web page for this service has garnered a great deal of attention in internet searches for fescue problems, resulting in questions, if not samples, on a weekly basis. In 2007, the laboratory processed a total of 23 endophyte samples. Fourteen of those samples were pasture samples; nine were seed samples. Of the nine seed samples, seven were official samples for the Seed Testing Laboratory and two were service samples or samples sent in for testing by the public. Of the 23 endophyte samples, three were out of state samples.

Education

Every year our Plant Industry Division has the opportunity to share our knowledge and expertise with others. We entertain many international visitors with visits and tours. Our Seed Lab is a popular attraction for all visitors. We also had the opportunity to teach four classes at NCSU to agricultural and horticulture students on seed production, seed testing, and seed pathology. Other exhibits included the Southern Farm Show in Raleigh and the North Carolina State Fair.

Biotechnology

The Seed Program has the responsibility for the biotechnology regulatory and compliance issues within the Plant Industry Division. This responsibility includes reviewing the permits and notifications issued by USDA Biotechnology and Regulatory Services (BRS) for laboratory, greenhouse, and field test of genetically engineered crops. Seed Program staff reviewed and acknowledged 191 notifications, 30 permits, and 13 existing acknowledgements for a total of 234 in 2007. Work also included oversight of GMO research on NCDA&CS' research units across the state, along with Ventria Bioscience's GM rice project in Plymouth, North Carolina.

FERTILIZER SECTION

Program staff implements the North Carolina Fertilizer Law, the North Carolina Agricultural Liming Materials and Landplaster Act, and the North Carolina Soil Additives Act. The overall goal of the program is to assure consumers, distributors, and manufacturers of the quality of fertilizers, agricultural liming materials, landplaster, and soil additives in the channels of trade in North Carolina. To accomplish this goal, Fertilizer Program staff randomly sample fertilizer and lime to (1) assure products in the marketplace are true to grade, (2) enforce labeling requirements, and (3) test for potentially contaminated products. We have streamlined the section by combining the duties of the seed and fertilizer inspectors. These employees have been cross-trained and are now implementing both the seed and fertilizer regulatory field inspections. In FY 2007, penalties totaling $242,242 were assessed on fertilizer and lime in North Carolina. Also. during the year, 69 'Stop Sale, Use, or Removal' orders were issued on fertilizer and lime in North Carolina and an additional 69 stop sales were resolved on site. The following information summarizes the different parts of the program and accomplishments for FY 2006-2007.

North Carolina farmers and other users of fertilizer and lime took advantage of early and mild spring conditions during 2007. In doing so, fertilizer tonnage usage was up approximately 9% and lime tonnage applied decreased approximately 12%. The North Carolina fertilizer industry is still undergoing changes with outlets servicing larger territories as farmers increase their farm sizes.

Fertilizer Bioassay Program

The Fertilizer Bioassay Program received 147 samples in 2007. Samples were taken by Seed and Fertilizer Inspectors and ground for testing by the Feed and Fertilizer Analysis Lab within the NCDA&CS' Food and Drug Division. Of the total number of samples, 145 were routine samples and two (2) were complaints. All samples were negative for herbicide contamination.

Tables 1 and 2 on the following page indicate data of fertilizer samples analyzed and liming materials and landplaster samples analyzed for FY 2007 compared to the previous four years.

The nine specialists in place made a total number of 11,857 dealer visits and a total of 24,383 inspections for the fiscal year 2007.

Fertilizers

Table 1: data of fertilizer samples analyzed for the 2007 fiscal year compared to the previous four years

FERTILIZER SAMPLING AND TONNAGE

Year	#Samples	#Compliant	%Compliant	Tonnage Reported	Tonnage Sampled	%Sampled
2006-07	2,473	1,900	76.80	1,605,642	37,259	2.30
2005-06	2,448	1,816	74.10	1,511,419	37,253	2.46
2004-05	2,662	2,065	77.57	1,400,426	44,352	3.17
2003-04	2,773	2,019	72.81	1,591,225	50,458	3.17
2002-03	3,468	2,621	75.58	1,399,516	299,488	21.39

Liming Materials and Gypsum (Landplaster)

Table 2: data of liming material and landplaster samples reported for FY 2007 compared to the previous four years

LIME SAMPLING AND TONNAGE

Year	#Samples	#Compliant	%Compliant	Tonnage Reported	Tonnage Sampled	%Sampled
2006-07	1,379	807	58.50	760,637	39,009	5.10
2005-06	1,021	805	78.80	914.990	48,200	5.27
2004-05	1,114	959	59.16	784,620	60,885	7.76
2003-04	719	613	85.26	787,186	31,793	4.04
2002-03	770	618	80.26	695,564	112,286	16.00

Liming material and landplaster tonnage reported in North Carolina decreased by 12% during FY 2007as compared to 2006.